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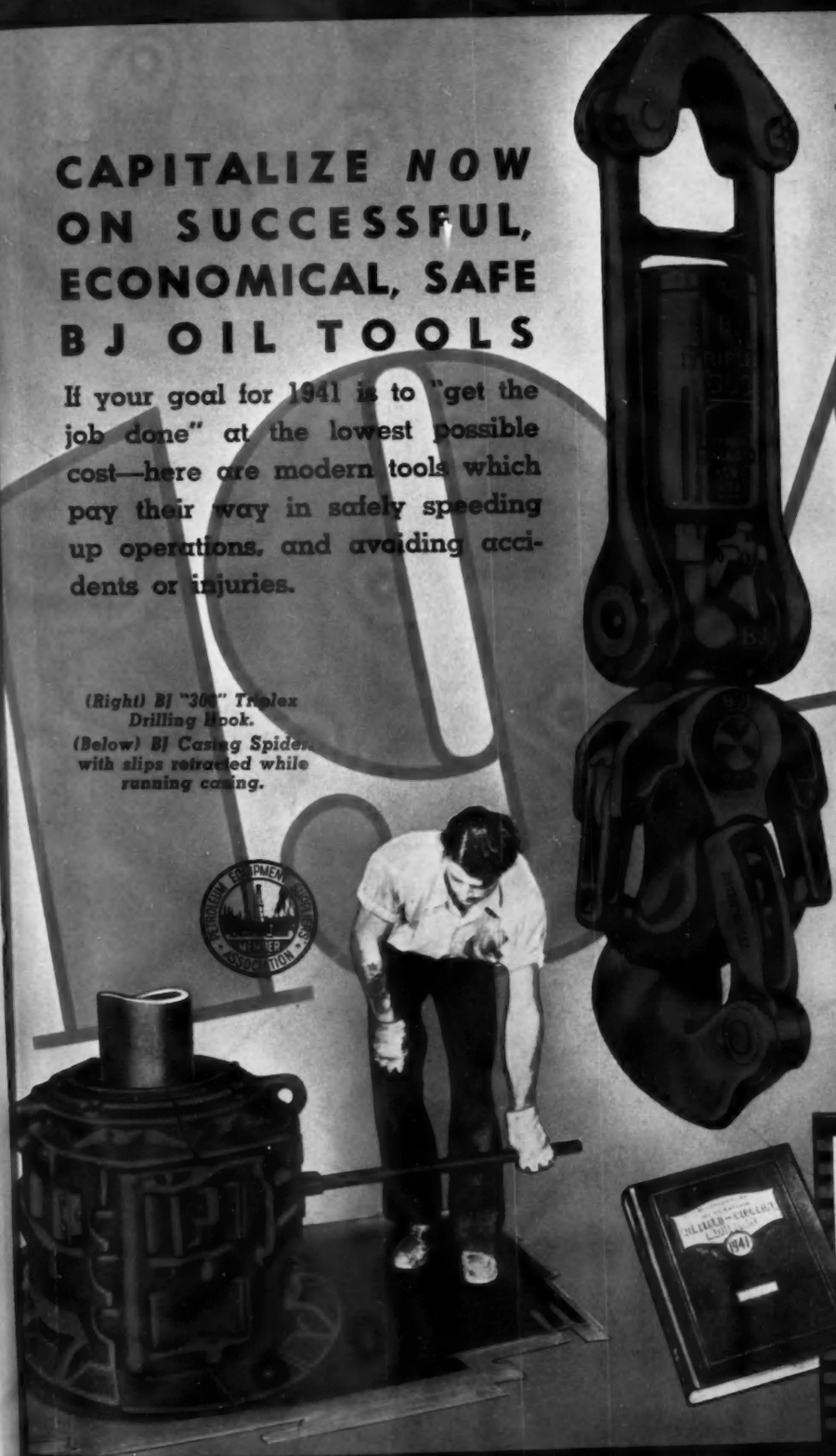
(Right) BJ "30" Triplex Drilling Hook.
(Below) BJ Casing Spider with slips retracted while running casing.



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BJ ELLIOTT WIRE LINE CORE DRILLS
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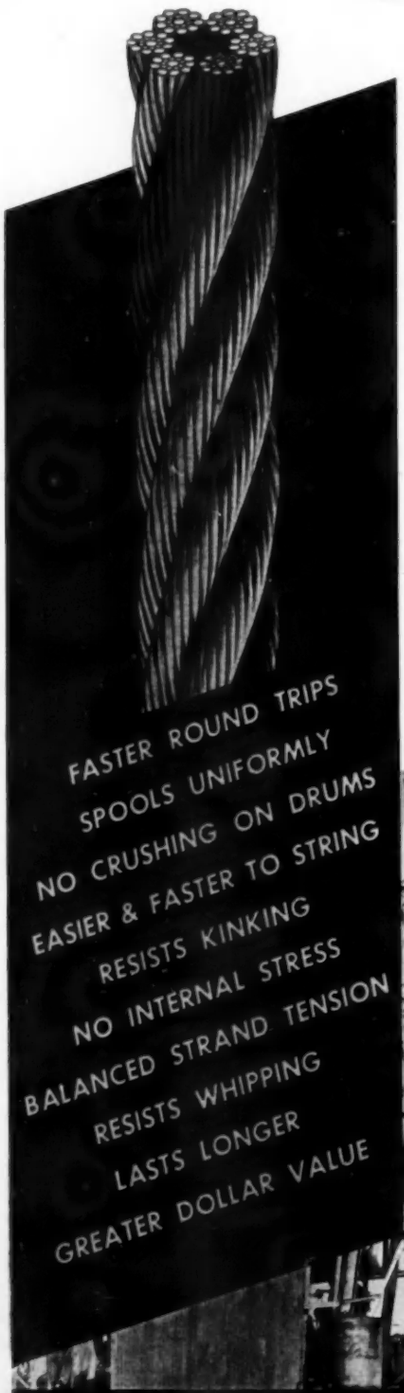

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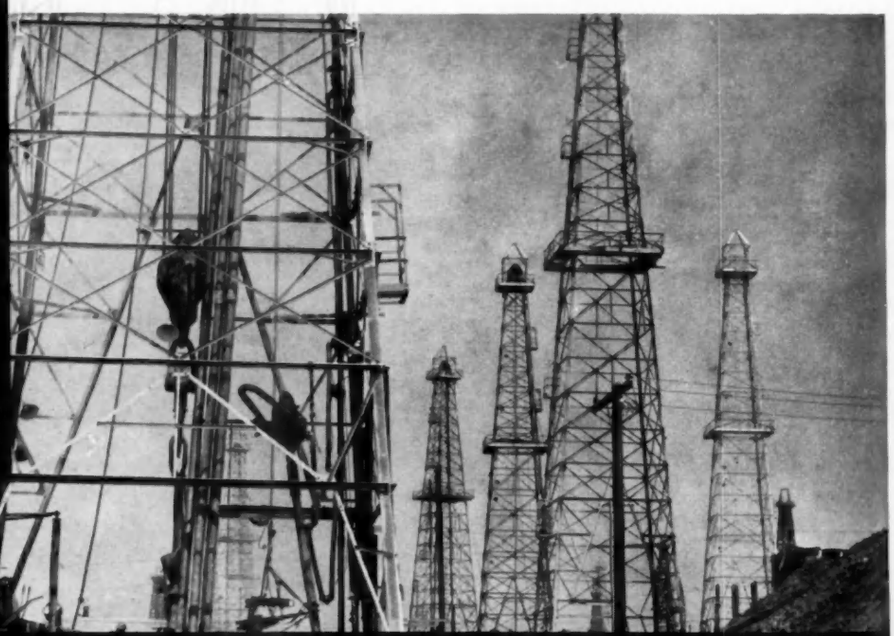

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The Baker Rotary Wall Scraper provides a safe, efficient means of enlarging the walls of an open hole to a diameter considerably greater than the casing or hole through which the tool is run. Furthermore, the enlargement may be performed at any desired point in the open hole.

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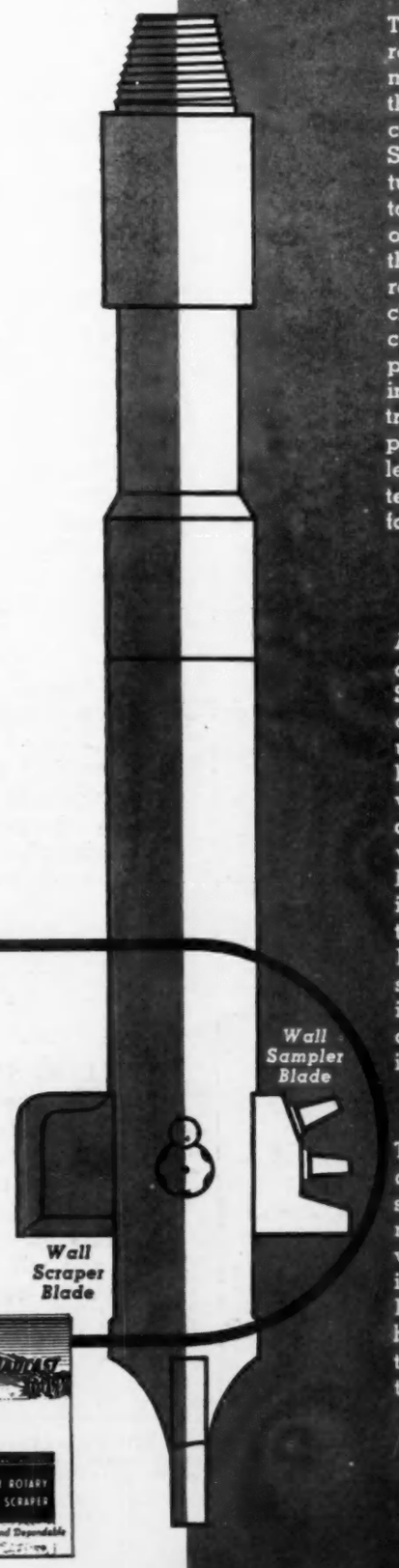
Enlarging Holes for Casing
Enlarging Holes for Gravel Packing
Bottlenecking for Cement Jobs
Cleaning up Oil Sands
Setting Cement Plugs
Directional Drilling
Water Shut-Off Tests
Setting Liners



Send for Baker Broadcast No. 19 which describes and illustrates the many important applications for the Baker Wall Scraper and Wall Sampler.

WALL SAMPLER

The Baker Rotary Wall Scraper is really "Two Tools in One," since by merely substituting Sampler Blades for the regular Scraper Blades the tool is converted into a Baker Rotary Wall Sampler . . . an exclusive Baker feature. With this device it is possible to take actual cores from the side-walls of any uncased hole at any depth, and thus opens up new opportunities for restoring lost core records, or for checking formations which were not cored when drilled through. It also provides a positive means of checking interesting zones brought out by electrical coring methods. The Wall Sampler cores range from 1½" to 2½" in length; from 7/16" to 11/16" in diameter, thus providing adequate samples for physical and laboratory tests.

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Each Sampler Blade has two core taking tubes screwed into the upper section of the flat outer edge. These Blades do not have a cutting edge, but serve only to get the core taking tubes into the formation and take any strain off the tubes as the Blades are forced into the walls of the hole.

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The safety of the Baker Wall Scraper and Wall Sampler has been demonstrated in thousands of successful runs made in oil fields throughout the world, under the most difficult operating conditions. To our knowledge no Baker Wall Scraper or Wall Sampler has ever failed to come safely out of the hole with the hole ready for further operations.

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LOOKING AHEAD

WITH THE EDITOR

IMPORTANT ACCUMULATIONS of oil and gas have been developed from stratigraphic reservoirs on and flanking the Central Kansas Uplift. With some geologists believing the industry's best opportunities for discovering additional crude oil reserves in the future to be through stratigraphic traps, such operations in Kansas become of more than local importance. An early article in THE OIL WEEKLY is to describe the economic significance of the stratigraphic reservoirs that have been found in that area.

The geographical scope of these stratigraphic producing areas takes in 17 counties in Central and Western Kansas. The vertical range covers the pre-Cambrian, the Cambrian, Cambro-Ordovician, Silurian, Mississippian and Pennsylvanian. The producing horizons include the granite wash, Reagan sandstone, Arbuckle dolomite, Simpson formation, Viola limestone, Hunton limestone, Misener formation, Mississippi chat, Sooy conglomerate and the Marmaton. Thus stratigraphic traps have been proven productive over a large geographical area and in many oil-bearing formations in several geologic zones.

In the past stratigraphic traps in Western and Central Kansas have been discovered largely by accident rather than as the object of any specific exploration. Today a new technique is being developed, and there is a definite search for this type of trap, including wedges, offshore bars, regional terraces, porosity changes, and flank truncated zones. New discoveries of importance are anticipated as a result of this campaign.

DRILLING STATISTICS covering the year 1940 will be published next week in THE OIL WEEKLY's regular monthly presentation of drilling activity data. This will be the first publication of information that will permit a comparison of completion rates with the preceding year. The material is to be broken down into major producing regions of the United States, and will reveal the percentage up or down of activity in each of the territories.

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THE OIL WEEKLY

ENGINEERING « NEWS » STATISTICS

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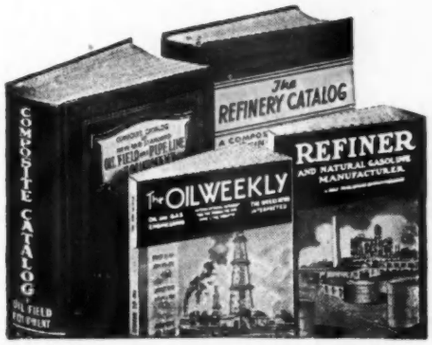

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The Oil Man's Calendar

1941	
JAN.	
11	**Mid-Continent Oil & Gas Association, Kansas-Oklahoma Division, Annual Membership Dinner, Tulsa.**
16–17	**Liquefied Petroleum Gas Association, Eastern Section, New York.**
FEB.	
22	**American Institute of Mining & Metallurgical Engineers, New York.**
22	**North Texas Oil & Gas Association, Wichita Falls.**
24–25	**Liquefied Petroleum Gas Association, Chicago.**
27–28	**American Petroleum Institute, Division of Production, Southwestern District, Shreveport.**
MAR.	
11	**American Petroleum Institute, Division of Production, Spring Meeting, Pacific Coast District, Los Angeles.**
APR.	
1– 3	**Society of Exploration Geophysicists, Houston.**
2– 4	**American Association of Petroleum Geologists, Twenty-sixth Annual Meeting, Houston.**
7–11	**American Chemical Society, St. Louis.**
16–18	**Western Petroleum Refiners Association, Hot Springs, Ark.**
17–18	**American Petroleum Institute, Division of Production, Eastern District, Pittsburgh.**
23–25	**Petroleum Industry Electrical Association, Tulsa.**
23–25	**Natural Gasoline Association of America, Dallas.**
25–26	**National Petroleum Association, Cleveland.**
25–26	**Petroleum & Natural Gas Conference, State College, Pa.**

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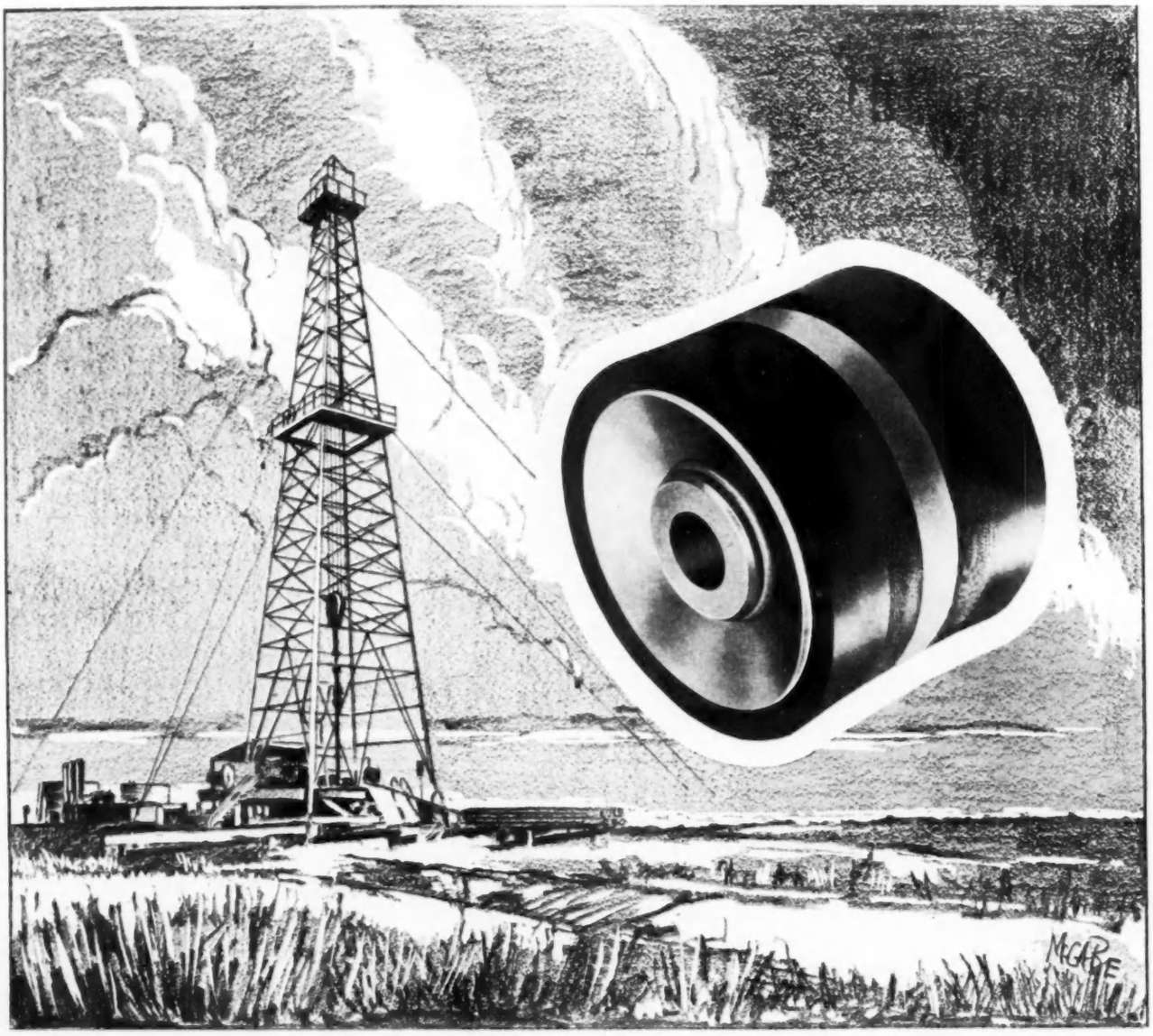

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THE OIL WEEKLY

JANUARY 6, 1941

VOLUME 100 NUMBER 5

The Changing Panorama

Russia's Oil Problem . . .

Russia's recent purchases of drilling machinery, plus other orders awaiting placement are so heavy that it is not believed that the Russians plan to make use of all of the equipment immediately. As a matter of fact, it is highly doubtful if Russia has at this moment enough trained men to operate the equipment already purchased. It appears probable that Russia has been counting on the entry of the United States into the World War and is simply protecting herself on drilling equipment in advance of such an eventuality.

In the meantime, shipments of American gasoline continue to Russia from the West Coast.

Although Russia is generally believed to have within its borders immense undeveloped and undiscovered crude oil reserves, in addition to the established fields, the country offers no indication of becoming an important exporter of petroleum.

Heretofore, the government-operated oil industry has had difficulty in supplying Russia's domestic requirements, despite the fact that the country's demand for oil has been disproportionately small in relation to the existing possibilities for advantageous use of trucks, tractors, automobiles, and other motorized equipment.

If full advantage were taken of modern motorized equipment in developing the country's resources, Russia's consumption of petroleum would expand immensely. And the Russian oil industry would be taxed to keep abreast of demand.

Apparently through military and strategic considerations, the Russian government has built up its civil aviation to impressive proportions and use, meeting heavy losses in operation of civil planes from the state budget. The country ranks first in the world from the standpoint of air-route mileage, having extended regular service to more than 88,000 miles in 1940. Planes are used not only for carrying passengers, mail, and freight, but also for combating forest fires, fighting insects, applying chemicals in areas of malarial infection, and other special purposes.

In contrast, however, use of automobiles and trucks in Russia has been remarkably limited and inefficient. Vehicles are unskilfully operated and serviced, with shortages existing in repair and service shops and also in capable engineers and mechanics. Idleness of vehicles for repairs consequently is excessive, and inefficient functioning of carburetors and motors causes waste in the use of fuel. Poor routing and dispatching of trucks cause also excessive travel without loads.

However, the government is giving increased attention to improvement of automotive transport, inasmuch as the army depends heavily on trucks and automobiles in its movements.

Texas Changes . . .

Rumors, which may have as their basis some wishful thinking, have been flying around Austin and oil centers in Texas regarding possible changes in policies resulting from the slight change in complexion of the Texas Railroad Commission occasioned by the entry of Commissioner Olin Culberson into the commission, and the implied criticism of the commission by President Roosevelt a short time ago.

There are rumors that C. M. Langford, who was fired as chief petroleum engineer for the commission in April, 1939, may be re-employed for duty as head of the Kilgore office. Reports from Austin say that this is possible if Langford, who is employed by a group of oil companies in a field near Houston, will accept. However, it is considered likely that he will not accept.

Rumors also revolve around Captain Stanley, friend of Culberson and Colonel Thompson, and not so good a friend of Commissioner Sadler. The rumors have it that he may be re-employed also, under a set-up by which considerable politics would be removed from the commission's affairs by discharge of political appointees and their replacement by engineers or more seasoned men. Authoritative sources, however, say that there is much wishful thinking behind this rumor.

Thompson and Sadler, who are working closely together now, with animosities of the recent gubernatorial election at least covered up if not buried, are reported to have gotten together and decided upon the men they would retain, in advance of Culberson's entry into the commission. Culberson is credited with having done some talking about some firing which would occur when he took office. Grapevine from Austin says that Culberson will be given the job in the commission of looking particularly after utilities.

Oil for Electric Power . . .

While use of fuel oil will be further increased in 1941 in consequence of additional installations of oil burners and increased activity of railroads and shipping, consumption will be enlarged also through construction of new electric power production plants. The utilities plan to carry out in 1941 the largest program of plant construction since 1930, with a large part of total expenditures going into new generating facilities.

Of the current production of electricity, 71 percent is obtained from fuels and the remainder from water power. The production from fuels in October required 4,874,032 short tons of coal, 1,672,068 barrels of fuel oil, and 17,151,388,000 cubic feet of natural gas.

The electric power plants in recent years have been using nearly one half as much fuel oil as the railroads and one third as much as the shipping industry.

Oil Matters Appear On Many Legislative Calendars

THE national congress and legislatures of two oil-producing states convened last week, and during the next ten days lawmakers of 16 other states will begin deliberations.

While Congress will deliberate federal control and other oil matters, lawmakers in some states will debate matters of almost as great importance to operators in those states.

Legislators in Michigan and Colorado started their biennial sessions on January 1, two days before convening of the Seventy-Seventh Congress. By January 14, legislative sessions will have started in all oil states except Kentucky, Louisiana and Mississippi, where lawmakers meet in even-numbered years.

Sessions opening this month will be restricted in length in some states, to as few as 40 days in Wyoming, while in others they can be expected to extend well into the summer months. Many bills will be buried in committees with forced adjournment of legislatures dictated by constitutional limits on length of sessions.

Congress Works on Defense

National defense will be the keynote at Washington.

Of major importance to the petroleum industry, the national defense program of the administration will include a new effort to obtain enactment of the Ickes-proposed measure providing for federal control of production in states which themselves do not have or do not adequately enforce proration statutes.

President Roosevelt on January 6 will personally deliver his annual message to the two houses of congress in joint session, and may have something to say about the oil situation, which in the past few weeks has assumed a new prominence in Washington.

Twenty-four hours after he makes his annual report to congress, the president will submit the annual budget, in which provision may have been made for funds for the building of oil storage facilities at strategic naval and military points throughout the country and for the acquisition of aviation gasoline and other products.

Administration officials believe injection of the national defense angle will be the lever with which the oil control bill can be shoved through congress, despite the opposition which for several years has stymied Secretary of the Interior Ickes' efforts to secure such legislation.

In Washington, it is foreseen that the plea of national defense will be injected into all sorts of legislation which will be submitted during the session, often, as allegedly in the case of the oil bill, without any sound basis for the claim that the national interest requires federal action.

Also foreseen is the possibility that the Navy may renew its efforts to secure the underwater oil fields off the coast of California and, possibly, in the Gulf of Mexico. Here, too, the national defense argument may prove a potent factor in whipping up lagging enthusiasm for the measure, which in the past has been exhaustively explored by senate and house committees without concrete results.

Under the circumstances, there appears to be little chance for legislation designed to reduce the mounting flood of imported oil. Administration efforts to further the "good neighbor" policy to knit more closely the ties with Latin American republics will work against any efforts to bar imports of oil from those countries. Efforts during the past year to secure State Department action revising the Venezuela reciprocal trade agreement have been unavailing, and no new conditions have arisen which would tend to alter the position of the Administration.

New Taxes Threatened

New taxes for the oil industry and for the men and companies engaged in it also loom as a possibility of the session. In the near future, Secretary of the Treasury Morgenthau will submit his views on taxes to congress and studies of the revenue situation will be undertaken, but it is not expected that any definite legislation will be written until after the returns for 1940 are filed on March 15, disclosing the results of the two tax bills enacted last year.

It is expected that bills calling for disintegration of the oil industry will be reintroduced, but their consideration is seen as dependent upon the attitude of the Administration with respect to reorganization of the industrial structure of the country during the defense emergency. It will be remembered that plans of the Department of Justice to ask divorce in a suit filed against the industry in the District of Columbia court last year were dropped at the insistence of the National Defense Advisory Commission, which pointed out that the uncertainties which such a plea would raise might react adversely to the defense program.

Possibilities that congress may be asked to appropriate funds toward construction of new pipe lines to serve the most important storage points of the Army and Navy are seen in difficulties reportedly encountered in reaching an agreement under which the industry itself would expend the many millions of dollars required for such a system.

Compact Has Two Measures

Consideration of the control bill and of recommendations for new pipe lines will bring to Washington representatives of the oil companies and the railroads, the former to insist that the industry is today capable of meeting any needs of the defense program without the guidance of the federal government, and the latter to argue that the transportation facilities now existing are adequate to insure the delivery of any and all oil and its products which the military services may need.

Two measures that will come before legislatures of most oil pro-

ducing states were discussed at a meeting of the Interstate Oil Compact Commission in Oklahoma City last week. One committee offered a complete new conservation law, while from another came a proposal that all states which are members of the Compact join in its financial support.

The conservation bill, prepared for suggestion to state legislatures by a legal subcommittee is probably the most comprehensive measure of its kind ever drawn. While members of the committee disagreed over some provisions, an outstanding feature covered every phase necessary to the control of production and distribution of crude oil and its products.

Several important definitions were included that would necessitate material changes in conservation laws of most states. Included in these definitions were those for market demand, condensate or distillate, ownership of oil and gas in place, casinghead gasoline and crude oil. Complete provisions were included for procedure, both before regulatory commissions and in the courts.

While, as Governor Leon Phillips pointed out, it is unlikely that the bill as drafted would be adopted by any state without amendment, it will furnish an excellent guide to any state interested in the control of oil and gas production. Where members of the committee were unable to agree, alternative clauses were provided to present divergent views.

Because of the influence the compact represents, it is probable that the bill will be introduced, at least, before legislatures in every state that produces oil. Because the bill is exceedingly broad and because it attempts to dispose of all controversial issues finally, it will undoubtedly be the subject of lengthy debate in every legislature where it may come up for discussion.

The bill for support of the compact itself seems likely to meet with much less opposition. Expenses of the compact heretofore have been borne by Oklahoma. A portion of the oil tax has been earmarked for this purpose, but as income from taxes declined, it has become more difficult to obtain sufficient funds.

Oklahoma, like other states, is attempting to reduce expenditures, and it has become more difficult to justify the expenditures for the compact when other states made no contribution. When the compact was first organized, Texas made an appropriation of $1500 to meet expenses involved. This money, however, was never used, and thereafter no appropriation was made.

While no bill was actually prepared, the finance committee "invited" the other states to join in the support of the compact. Members discussed plans for expanding operations of the compact, but no definite proposals were made. Observers were unable to obtain positive information concerning these plans, although vague mention was made of a program to expand activities along engineering lines. This would probably entail establishment of some research program under the supervision of prominent engineers whose services have been volunteered.

Legislatures of 18 oil-producing states convene this month, the majority in biennial session. Their deliberations will extend from 40 days, in the case of Wyoming, to several months in states where no constitutional limit is placed on the length of session. The seventy-seventh congress convened January 3 and, in view of the defense emergency, it is unlikely that it will adjourn before the year's end.

Legislatures meeting this month, dates they start work, and the length of their sessions, follow:

Arkansas	January 13	60 days
California	January 6	None
Colorado	January 1	None
Illinois	January 8	None
Indiana	January 9	61 days
Kansas	January 14	50 days
Michigan	January 1	None
Montana	January 6	60 days
Nebraska	January 7	None
New Mexico	January 14	60 days
New York	January 6	None
Ohio	January 6	None
Oklahoma	January 7	None
Pennsylvania	January 7	None
Tennessee	January 6	75 days
Texas	January 14	None
West Virginia	January 13	60 days
Wyoming	January 14	40 days

State Action

Representatives of the states who attended the meeting expressed the opinion that there would be little difficulty in obtaining legislative appropriations for compact work. This group included men from Illinois, Texas, New Mexico, Colorado, Kansas and Oklahoma.

While none of the regulatory bodies of oil-producing states, compact members or non-members, up to last mid-week had expressed intention to seek revisions to existing conservation measures in line with recommendations of the compact's legal subcommittee, it was apparent that important changes in conservation legislation and its administration would be sought in at least five states—California, Michigan, Montana, Oklahoma and Texas. Steps will be taken to obtain conservation acts in at least two states, Illinois and Nebraska.

Illinois Is Question

Illinois remains much the legislative question-mark it has been during the past two years. Dwight Green, Republican successor to the late Democratic Governor Henry Horner, who tried repeatedly during his administration to gain enactment of a conservation law, has expressed himself in favor of legislation for "orderly development" of the state's oil fields. He has not enlarged upon his views, but there is general sentiment that he will support legislation for production control, bringing the state in line with other members of the compact.

Some of the groundwork for control legislation was laid by the Illinois legislature two years ago when it enacted a permit law and an act requiring filing of logs of completed wells. The permit law makes granting of permits for wells compulsory, and there is no provision to make filing of well logs mandatory, but operators are cooperative with state departments in administration of both measures, providing some of the necessary basic data upon which a conservation program may be administered.

Governor Green's support of a conservation act, should it be forthcoming, would not assure its en-

actment. Governor Horner gave his wholehearted support, unsuccessfully, to such proposed legislation during the regular session in 1939, and during a special session.

Illinois legislators, working under a Republican administration, can be expected to watch Washington. Definite indication that congress will provide federal control for states without conservation legislation would strengthen chances for enactment of a state act. The Illinois legislature, judging from past sessions, will probably not adjourn before summer.

Nebraska's $50,000 Bonus

The Nebraska legislature will be called upon to appropriate $50,000 promised during a previous session to the first company or individual to complete a commercial oil well in that state. The well was drilled, and the bill is to be paid.

Now with two pools within its borders, both in the Forest City Basin area, Nebraska may see enactment of conservation and other measures seeking orderly development.

California May Join Compact

The Oil Producers Agency of California, through its board of directors, has called for state membership in the Interstate Oil Compact Commission. A resolution requesting enabling legislation has been sent to the governor, the state director of natural resources, and to each member of the legislature.

California has been operating under recommendations of a voluntary conservation committee, and it is the opinion of the association that active membership of the state in the compact will give more prestige to the treaty of states, and will give California full voice in deliberations of the compact.

The state now has laws for conservation of gas, for protection of underground strata from water infiltration, for avoidance of unnecessary fire hazards, for well spacing, and for efficient use of reservoir energy in producing wells.

May Retreat in Michigan

It is expected that a bill to abolish or amend the oil conservation act passed by the Michigan 1939 legislature will be introduced during the current session. It is believed, however, that the Oil & Gas Association of Michigan, which fostered the present law and which claims a large majority of producers and production in its membership, will be able to muster sufficient support to balk any attempt to wipe it from the books or alter it in any of its more potent provisions.

The newly organized Oil Institute of Michigan, embracing four of the state's largest independent refiners in its directorate, has by inference voiced opposition to the act. The institute has blamed the act as largely responsible for a decline in pool discoveries and in production. It wants no curtailment in production until the daily supply is equal to the daily demand as converted from finished product sales to crude oil, or about 150,000 barrels of crude a day, more than three times the state's present production.

In a later statement, the institute declared it had "no fight with true conservation," and its executive secretary, L. V. Nicholas, said it was planning no legislation.

Governor Murray D. Van Wagoner, Democratic successor to Republican Governor Dickinson, has not made a public expression of his views on oil legislation.

Other expected Michigan bills will seek to bring spacing, drilling and proration of natural gas wells under jurisdiction of the Department of Conservation (the Public Safety Commission now has jurisdiction over gas wells); to exempt oil royalties from the 1939 intangible tax act, and to amend the act that requires a period of 15 years possession for clear title under adverse possession.

Secondary Recovery in Oklahoma

Legislation to facilitate secondary recovery operations and to eliminate the 3-percent deduction for waste and foreign substance made by purchasing companies will be pushed by the Oklahoma Stripper Well Association. Another expected bill will attempt to increase the gross-production tax to gain additional revenue to meet a state deficit.

Lack of legislation has been retarding secondary recovery programs in Oklahoma fields, repressuring programs by natural gas and water-flooding thus far being confined to areas where voluntary agreements could be worked out by operators. No compulsion can be exercised against operators not inclined to join in such programs, and in some areas water-flood projects are spotted with leases not in the programs. Similarly, proposed repressuring of the Wilcox-sand zone in the Oklahoma City field has been delayed more than a year by failure to get 100 percent of leaseholders and royalty owners behind the project. The program in this field would be one of the largest of its kind attempted, and would recover an estimated 200,000,000 or more barrels of additional oil.

Oklahoma is one of the few states still permitting 3-percent deduction in purchasing contracts to cover foreign matter, and a change in the statute would tend to extend the uniformity of purchasers contracts and increase state revenue. State tax is collected on 97 percent of oil run.

The oil industry is Oklahoma's greatest taxpayer, and the one first looked to when additional state revenue is needed. Accordingly, it is certain that pressure will be exerted by some groups to increase the gross-production tax, and possibly also to place a tax on natural gasoline, lubricants, greases, fuel oil, road oils, and other products.

Producers will be called upon to join with other branches of the industry in resisting increases in the gasoline tax and attempts to divert gasoline-tax revenue to purposes other than roads.

Separate Texas Commission

Groups within the industry will join with other interests to gain divorcement of oil and gas conservation from railroad, trucking, electric and other regulatory duties.

There are differences in opinion as to the best method of reaching this end. The West-Central Texas Oil & Gas Association is seeking a new oil and gas commission, with members to be appointed by the governor. Members of the present Railroad Commission of Texas are elected, one member every two years for a six-year term.

Another group of operators seeks legislation stripping the present commission of all duties other than conservation of oil and gas, with a separate body established to take over other regulatory duties now handled by the commission. Pipe lines, as utilities, would be regulated by the new body.

Regulation and proration of distillate production will be sought by the Gulf Coast Refiners Association. The group contends that derivatives of crude petroleum produced by recycling plants constitutes, in effect, crude oil produced under no restriction and used in direct competition with crude oil subject to proration, and is an im-

[*Continued on page 78*]

The Will to Help

READERS of THE OIL WEEKLY are fully aware that this publication has not seen eye to eye with President Roosevelt on many of his policies. It is our right under a democracy to criticize that with which we are not in accord, and there are many things under the New Deal which we think justify the severest criticism.

But we do not think that those who cry that he is dragging us into war are justified in assuming that it is simply President Roosevelt who is dragging us into war. Our country was dragged into the war when France fell—when the Battle of Britain began—and whether or not we hate war, and no matter how terrible the consequences of it may be, there is no escape from the fact that it is our fight which is being waged in the skies of England, in the mountains of Albania and on the deserts of Africa.

We here in America have seen within recent years attempts to change our form of government, have seen attempts successfully made to set groups of Americans against other groups of Americans—and we have fought against these things with all our might. We have sensed that there are many in high places who would substitute ideologies of their own for our time-tested democracy—just as Hitler and Mussolini and Stalin have substituted their own ideologies for those which went ahead of them. With these vipers within our own midst we do not make peace.

But against the greater vipers of Europe we have greater cause to fight—for they would not leave even a vestige of democracy to us. Those Americans who have plotted to change our form of government without calling it a change, are, for the most of them, little more than a crowd of crackpots—leavened with some who may be in foreign pay. With them we can and will settle—because the great mass of American people believes in and loves personal freedom—even though it might foolishly exchange it temporarily for a mess of pottage.

But the forces aligned against democracy abroad are not crackpots—they are in deadly earnest in their intent to impose upon the world a dominance which returns us to the olden days of brute force—substituting for the kindlier things of life a conscienceless efficiency which finds its expression in making slaves of fellow beings.

The isolationist who thinks that America can live to herself takes no account of the effect of international trade on American life. We have heard, in public forum, speakers who assert that they have no wish to fight for the profits of American capital abroad. Foolish idea. Into every dollar's worth of American trade abroad goes American labor — salaries, salaries, wages, wages—until the profit in the dollar itself is a pitiful thing compared with the food that this trade has put on American tables.

The other evening we heard a college professor exclaim, as though he were propounding something profoundly new, that the reason for all the war talk in America is fear. True, it is fear—thoroughly justified fear that America may lose all she holds dear. It is not necessarily fear of an early invasion of North American soil—that we can discount for years to come—but the fear of an insistent pressure which would force us to live within ourselves—constant pressure to change our method of government—fear of an ultimate ring of enemies. There is no shame in this fear. It stimulates us to do that which common sense tells us we should do.

We feel that most Americans—an overwhelming majority of Americans, believe that our administration is right in its attitude on helping England—although some of us abhor extra-legal methods of granting the aid. We agree that England made the mistake of her history when her war debt to America was lightly treated. Some of us may burn red with the recollection that when all whom we had helped, but Finland, turned thumbs down on honest debts—debts of honor—some of us expressed the hope that they might someday need our help, in order that we might remind them of their shameful attitude. But most of us are willing to forget that ingratitude—we want to help—help with every ounce of our power—in the battle which is also ours.

We want our help to be material—to be forceful—and we want our government to be practical in its application.

Above all we want to see a United America—to see the administration itself appreciate the seriousness of the task fully as much as the administration says it wants the people to appreciate it. We do not believe that official Washington fully appreciates the enormity of the task we face—we do not believe that the administration has as yet approached the job from the practical standpoint from which it must be approached.

The people are behind the administration in its desire to aid—but God help a president or a government official, high or low, who prostitutes our need to his own greedy desire for power or personal gain.

YOU KNOW THIS ONE, MR. PRESIDENT

"There are also American citizens, many of them in high places, who, unwittingly in most cases, are aiding and abetting the work of these agents. I do not charge these American citizens with being foreign agents. But I do charge them with doing exactly the kind of work that the dictators want done in the United States."—President Roosevelt in his fireside chat of December 29, 1940.

Mr. President, about two weeks ago a man in "a high place" attempted to eliminate from the national defense sources of the United States, one of the largest and most efficient manufacturing concerns in the U.S.A. He did this because his clique had been unable to impose its partisan will on this particular company and apparently he was willing to cripple national defense by "tuning out" a powerful source of aid. We submit, Mr. President, that his action could be termed as "setting capital against labor" or "vice versa" to quote from your remarks immediately preceding those remarks reproduced above.

You know him pretty well, Mr. President, because you appointed him to one of the most important posts in this national emergency — the Council of National Defense. His name is Sidney Hillman.

Expanding Business Bringing Stronger Markets

FOLLOWING the difficulties of 1940, prominent among which were the loss of export business and the sinking of gasoline prices to extremely low levels, materially improved conditions appear to be in store for the oil industry in 1941.

The industry faces the prospect of unprecedented demand for its products, despite possible further shrinkage of exports. And the indicated large demand promises to be doubly beneficial, by expanding volumes of business and by promoting stronger markets, with balancing of supply with demand made easier.

In short, oil companies apparently will be fortified in 1941 with the two fundamental requisites for satisfactory operations and earnings; namely, large volumes of business and comparatively favorable prices.

Not since 1937 has the New Year's outlook been quite as promising.

Heavy Fuel Situation

Standing out as a major problem for 1941 is the responsibility of providing adequate supplies of heavy fuel oil. Requirements will be exceptionally large, because of the prospective brisk industrial activity, and fulfillment of the demand will necessitate precautions against an attendant over-supplying of the requirements of other petroleum products less urgently needed.

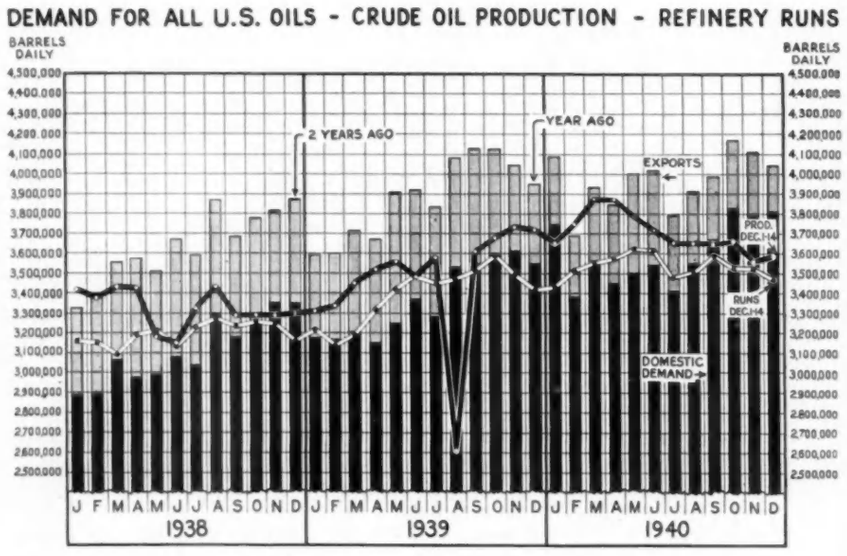
The Bureau of Mines went into this matter in considerable detail in its forecast for January, and indicated that prospective large demand for heavy fuel oil would require henceforth increased yields of the heavy oils at the refineries or increased imports, as alternatives to the running of more crude to stills than necessary for adequately supplying other products.

"A sharp rise in the demand for residual fuel oils is indicated as defense activities get into full production," stated the bureau. "Residual fuel stocks east of California, although several million barrels above the abnormally low level of last year, appear to be inadequate. As indicated in the December forecast, this situation would require either greater runs than are necessary for other products, increased yields, or larger imports."

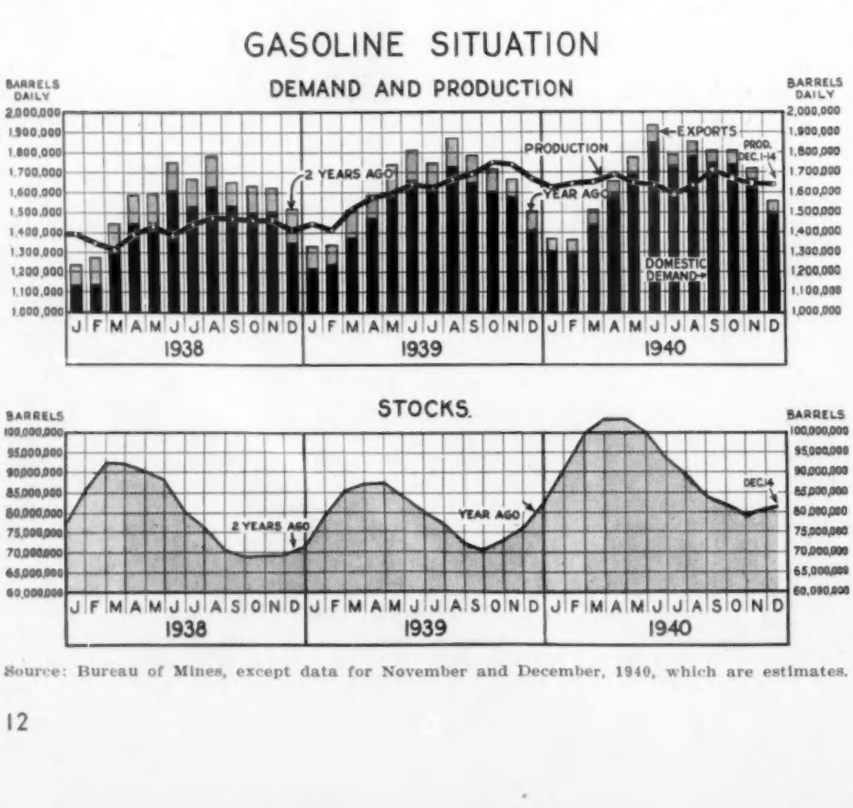
Heretofore, the situation has been met by the industry by increasing yields of heavy fuel oils, as well as by bringing in larger quantities of crude and fuel oil from South America, under the Venezuelan agreement, which permits crude and fuel oil imports up to specified proportions at one half the regular tax rates.

The industry, accordingly, was taking at the refineries in October a relatively low yield of gasoline, a normal distillate yield, and an increased residual yield; and it may be expected to continue the pursuance of a similar policy with regard to yields.

While heavy fuel oil is an impor-


DEMAND FOR ALL U.S. OILS - CRUDE OIL PRODUCTION - REFINERY RUNS
BARRELS DAILY
2 YEARS AGO
YEAR AGO
EXPORTS
PROD. DEC. 1-14
RUNS DEC. 1-14
DOMESTIC DEMAND
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1938
1939
1940

Source: Bureau of Mines, except data for November and December, 1940, which are estimates.

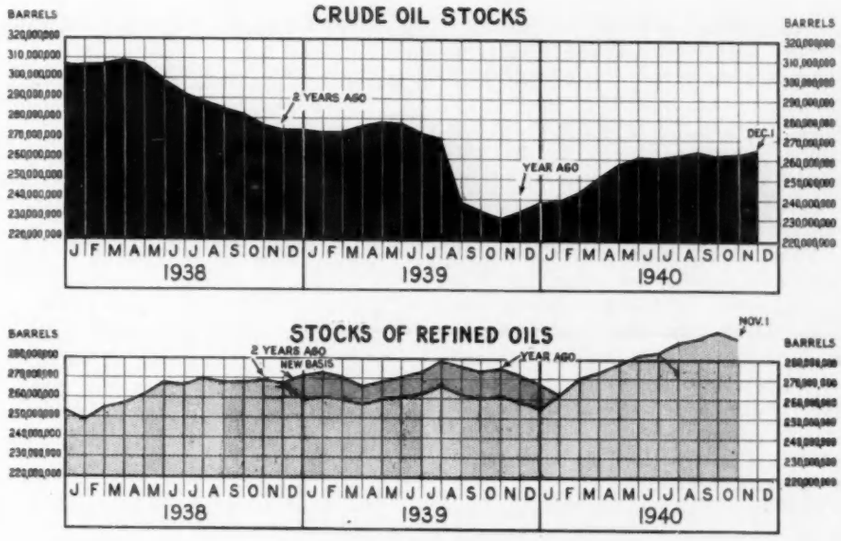

GASOLINE SITUATION
DEMAND AND PRODUCTION
BARRELS DAILY
2 YEARS AGO
PRODUCTION
YEAR AGO
EXPORTS
PROD. DEC. 1-14
DOMESTIC DEMAND
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1938
1939
1940
STOCKS
BARRELS
2 YEARS AGO
YEAR AGO
DEC. 14
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1938
1939
1940

Source: Bureau of Mines, except data for November and December, 1940, which are estimates.

tant product of the industry from the standpoint of volume involved, gasoline remains the principal refined oil and the one around which operations are shaped. The industry is encouraged, therefore, by the outlook for more wieldy gasoline stocks and a better gasoline market in the coming year.

During the past several months, the gasoline inventory situation has been materially improved, with refinery runs held down to fairly moderate proportions and with the yields of gasoline deliberately minimized. In relation to demand, the stocks have become increasingly more conservative. And although a normal seasonal build-up is indicated for the winter, stocks likely will not climb to the excessively high level that was reached at the beginning of last spring; and for the stocks that will be on hand, a larger market will be available.

The Bureau of Mines anticipated that stocks of finished and unfinished gasoline would be about 82,000,000 barrels on December 31, 1940, and said that a normal increase of at least 14,000,000 barrels seemed unavoidable for the first quarter of 1941. A peak of 96,000,000 barrels was foreseen as probable, therefore, for March 41, 1941, as compared with almost 104,000,000 barrels at that time in 1940. That expected stock position would represent a material improvement, the bureau pointed out, because of an expected increase of 6 to 7 percent in domestic motor-fuel demand during 1941 and also because the figure will include an increase of several million barrels in essential aviation gasoline stocks.


CRUDE OIL STOCKS
BARRELS
2 YEARS AGO
YEAR AGO
DEC. 1
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1938
1939
1940
STOCKS OF REFINED OILS
BARRELS
2 YEARS AGO
NEW BASIS
YEAR AGO
NOV. 1
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1938
1939
1940

Source of Data: Bureau of Mines.

Total Oil Demand Up 2 Percent for First 10 Months of 1940

Figures indicate barrels, and are from Bureau of Mines

	OCTOBER			FIRST TEN MONTHS		
	1939	1940	Percent Change	1939	1940	Percent Change
SUMMARY						
Total Demand	126,878,000	129,546,000	+ 2.1	1,173,431,000	1,200,875,000	+ 2.3
Daily Average	4,093,000	4,179,000	+ 2.1	3,860,000	3,937,000	+ 2.0
Exports:						
Crude Petroleum	6,947,000	5,269,000	— 24.2	62,097,000	45,721,000	— 26.4
Refined Products	9,804,000	6,044,000	— 38.4	100,509,000	68,027,000	— 32.3
Total Exports	16,751,000	11,313,000	— 32.5	162,606,000	113,748,000	— 30.1
Domestic Demand:						
Total Domestic Demand	110,127,000	118,233,000	+ 7.5	1,010,825,000	1,087,127,000	+ 7.6
Daily Average	3,552,000	3,814,000	+ 7.4	3,325,000	3,564,000	+ 7.2
TOTAL DEMAND FOR PRODUCTS						
Motor Fuel:						
Domestic	49,854,000	53,807,000	+ 7.9	464,295,000	493,937,000	+ 6.4
Exports	3,443,000	2,149,000	— 37.6	38,942,000	20,919,000	— 46.3
Total	53,297,000	55,956,000	+ 5.0	503,237,000	514,856,000	+ 2.3
Aviation Gasoline: (included above):						
Domestic	*	553,000	.....	*	4,317,000	.....
Exports	301,000	291,000†	— 3.3	3,588,000	3,263,000	— 9.1
Total	.....	844,000	.....	.....	7,580,000	.....
Kerosene:						
Domestic	5,019,000	5,608,000	+ 11.7	47,867,000	54,200,000	+ 13.2
Exports	1,107,000	142,000	— 87.2	7,022,000	3,068,000	— 56.3
Total	6,126,000	5,750,000	— 6.1	54,889,000	57,268,000	+ 4.3
Gas Oils and Distillate Fuels:						
Domestic	10,908,000	13,574,000	+ 24.4	107,138,000	127,321,000	+ 18.8
Exports	2,756,000	1,356,000	— 50.8	27,906,000	16,935,000	— 39.3
Total	13,664,000	14,930,000	+ 9.3	135,044,000	144,256,000	+ 6.8
Residual Fuel Oils:						
Domestic	28,323,000	29,976,000	+ 5.8	259,023,000	272,297,000	+ 5.1
Exports	1,296,000	1,366,000	+ 5.9	15,049,000	13,830,000	— 8.1
Total	29,619,000	31,342,000	+ 5.8	274,072,000	286,127,000	+ 4.4
Lubricants:						
Domestic	2,656,000	2,443,000	— 8.0	19,961,000	20,294,000	+ 1.7
Exports	985,000	654,000	— 53.6	9,381,000	9,274,000	— 1.1
Total	3,641,000	3,097,000	— 14.9	29,342,000	29,568,000	+ 0.8
Wax (pounds):						
Domestic	40,567,000	37,350,000	— 7.9	241,641,000	294,453,000	+ 21.9
Exports	19,210,000	10,636,000	— 44.6	205,689,000	169,830,000	— 17.4
Total	59,777,000	47,986,000	— 19.7	447,330,000	464,283,000	+ 3.8
Coke (short tons):						
Domestic	158,500	134,000	— 15.5	1,172,400	1,163,400	— 0.8
Exports	22,700	33,400	+ 47.1	235,100	233,600	— 0.6
Total	181,200	167,400	— 7.6	1,407,500	1,397,000	— 7.5
Asphalt (short tons):						
Domestic	543,000	647,800	+ 19.3	4,301,600	4,559,500	+ 6.0
Exports	3,500	21,600	+517.1	37,900	253,200	+568.1
Total	546,500	669,400	+ 22.5	4,339,500	4,812,700	+ 10.9
Road Oil:						
Domestic	577,000	683,000	+ 18.4	7,563,000	7,380,000	— 2.4
Miscellaneous:						
Domestic	173,000	189,000	+ 9.3	1,850,000	1,768,000	— 4.4
Exports	17,000	53,000	+211.8	91,000	834,000	+816.5
Total	190,000	242,000	+ 27.4	1,941,000	2,602,000	+ 34.1

* Not available. † Includes 132,000 barrels anti-knock compounds.

Over-All Outlook

While heavy fuel oil and gasoline will be consumed in large quantities in 1941, other products also are expected to be in good demand. In the January forecast, the Bureau of Mines embodied a prediction on consumption for the year and for the first quarter as well as for the initial month, pointing out that it was necessary to consider the probable demand for all oils during the coming year to secure the proper perspective for a reasonable forecast of operations for the first quarter.

The bureau stated, accordingly, that an increase of 8 percent in the daily average demand for all oils in 1941, including special defense requirements and stocks, seemed a reasonable and conservative assumption, assuming no drastic changes in international relations. Such a gain would constitute an actual increase of about 102,000,000 barrels for the year. It was conceded, however, that a further loss in exports might reduce that figure to a 6-percent increase in the total demand for all oils, a gain of about 87,000,000 barrels in 1941 over 1940.

As to how the increased demand may be met, the Bureau of Mines

offered several definite suggestions. Almost half of the gain would be taken care of simply by maintaining crude production at the same daily average rate as in 1940, the agency pointed out, as the wells of the country during 1940 turned out about 40,000,000 barrels more oil than the markets absorbed, as evidenced by an increase of that amount in the stocks of all oils, crude and refined. Crude oil production in 1940 averaged about 3,700,000 barrels daily, according to the bureau, and consequently, that rate of production, in absence of any stock changes, would supply nearly half of the indicated 87,000,000-barrel increase in 1941 in the demand for all oils. The remaining increase of 47,000,000 barrels in the demand for all oils might be met, the agency suggested, by stock decreases of 10,000,000 barrels, by increased imports of 10,000,000 barrels, and by a gain in crude oil production of 27,000,000 barrels. This would indicate a daily average crude oil production of 3,775,000 barrels in 1941, an increase of 2 percent over 1940.

Having taken into consideration prospects for exports and imports and changes in stocks, the federal government agency calculated that an increase in crude runs to stills of over 4 percent was indicated—or an average rate of nearly 3,700,000 barrels daily for the whole year 1941.

Material expansion of demand beyond the above indicated proportions would necessitate increases in both crude production and runs to stills, the Bureau of Mines stated; and refinery operations east of California might be close to capacity, particularly if crude runs in the first quarter are at too low a level.

Gains in demand in 1941 as compared with 1940 will differ considerably for the several quarters of the year. Because of the abnormally high demand in the first quarter of 1940, the increase for the initial quarter of 1941 may be below the estimated average gain for the year. But the relative increase in subsequent quarters would be progressively greater.

The forecasts of demand and necessary crude runs for January as set forth by the Bureau of Mines in a table presented herewith were described by that agency as representing a minimum, and it pointed out that the figures might have to be increased in subsequent forecasts for February and March, if the trend of demand should prove greater than presently indicated as probable.

An over-all increase of 5.3 percent

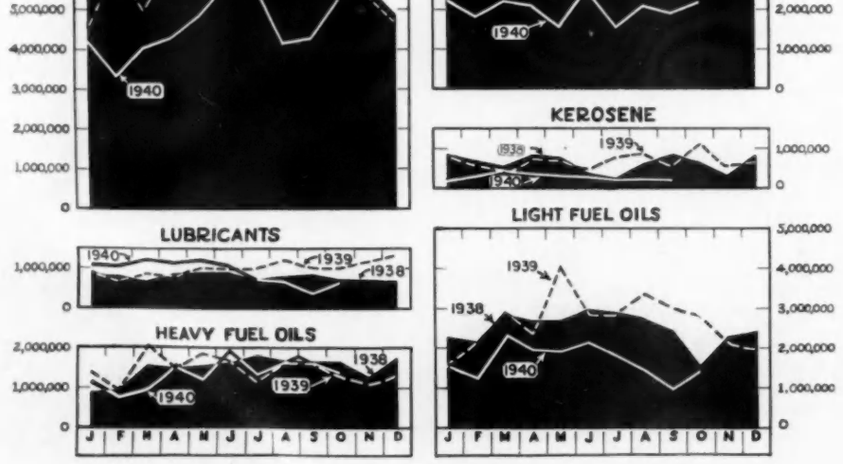
Oil Exports Continue Down One Third From Year Ago

Figures indicate barrels, and are from Bureau of Mines

ITEM	FIRST TEN MONTHS 1939	FIRST TEN MONTHS 1940	FIRST TEN MONTHS Percent Change	MONTH OF OCTOBER 1939	MONTH OF OCTOBER 1940	MONTH OF OCTOBER Percent Change
Crude Oil	62,097,000	45,721,000	— 26.4	6,947,000	5,269,000	— 24.2
Products:						
*Motor Fuel	38,942,000	20,919,000	— 46.3	3,443,000	2,149,000	— 37.6
Aviation Gasoline (included above)	3,588,000	3,263,000	— 90.6	287,000	291,000†	+ 1.4
Kerosene	7,022,000	3,068,000	— 56.3	1,107,000	142,000	— 87.2
Gas Oil and Distillate	27,906,000	16,935,000	— 39.3	2,756,000	1,356,000	— 50.8
Residual Fuel Oil	15,049,000	13,830,000	— 8.1	1,296,000	1,366,000	+ 5.4
Lubricants	9,381,000	9,274,000	— 1.1	985,000	654,000	— 33.6
Wax (pounds)	205,689,000	169,830,000	— 17.4	19,210,000	10,636,000	— 44.6
Coke (short tons)	235,100,000	233,600,000	— 0.6	22,700,000	33,400,000	+ 4 .1
Asphalt (short tons)	37,900,000	253,200,000	+ 85.0	3,500,000	21,600,000	+ 517.1
Miscellaneous Oils	91,000	834,000	+ 89.1	17,000	53,000	+ 211.8
‡Total Refined Products	100,509,000	68,027,000	— 32.3	9,804,000	6,044,000§	— 38.4
Total Crude and Products	162,606,000	113,748,000	— 30.1	16,751,000	11,313,000	— 32.5

* Includes Benzol 1,000 barrels in October, 1940. † Includes 132,000 barrels anti-knock compounds.
‡ Not sum of the above figures, some of which do not indicate barrels. § Exclusive of 8,000 barrels exports from non-contiguous territories but inclusive of 1,119,000 barrels shipped from United States to territories.

U. S. Exports of Crude Petroleum and Refined Products



Source of Data: Bureau of Mines.

Changes from Year Ago in Stocks of Crude and Refined Oils in the United States

(Figures indicate barrels)

LATEST WEEKLY DATA

(Sources: Crude stocks, Bureau of Mines: all other figures American Petroleum Institute).

STOCKS OF:	December 21, 1939	December 21, 1940	Percent Change
Gasoline	80,905,000	81,870,000	+ 1.2
Gas Oil & Distillate	35,063,000	42,260,000	+20.5
Residual Fuel Oil	107,149,000	102,841,000	— 4.0
Crude Oil	*232,615,000	†261,293,000	+ 1.2

LATEST MONTHLY DATA

(Source: Bureau of Mines)

ITEM	Stocks at End of October 1939	1940	Percent Change
SUMMARY—			
Crude Petroleum:			
Refinable in U.S.	231,852,000	263,856,000	+ 13.8
Heavy in California	14,070,000	12,353,000	— 12.2
Natural Gasoline	5,140,000	6,569,000	+ 27.8
Refined Products	275,854,000	290,918,000	+ 5.5
Total, all Oils	526,916,000	573,696,000	+ 8.9
Day's Supply:			
October Basis	129	137	+ 6.2
10 Months Basis	136	146	+ 7.4
PRODUCTS—			
Gasoline:			
Finished	68,116,000	73,338,000	+ 7.7
Unfinished	5,203,000	5,847,000	+ 12.4
Total	73,319,000	79,185,000	+ 8.0
Aviation Gasoline (included above)	2,400,000	6,142,000	+155.9
Kerosene	9,967,000	11,000,000	+ 10.4
Gas Oil & Distillate Fuels	40,093,000	49,037,000	+ 22.3
Residual Fuel Oils	99,921,000	94,658,000	— 5.3
Lubricants	6,639,000	8,464,000	+ 27.5
Wax (pounds)	81,147,000	113,827,000	+ 40.3
Coke (short tons)	652,000	581,000	+ 10.9
Asphalt (short tons)	472,000	469,000	— 0.6
Road Oil	715,000	719,000	+ 0.6
Miscellaneous	289,000	341,000	+ 18.0
Other Unfinished Oils	38,765,000	41,623,000	+ 7.4

* Stocks on hand December 16, 1939.
† Stocks on hand December 14, 1940.

in motor fuel demand was forecast by the Bureau of Mines for January, 1941, as compared with January, 1940. Domestic demand was estimated at 43,000,000 barrels for the month, or 6.5 percent higher than the actual demand for January, 1940. The estimate for exports of motor fuel, based on forecasts by the principal exporters, was 1,900,000 barrels. That was 100,000 barrels more than the December estimate but 374,000 barrels, or 16.4 percent, lower than the actual for January, 1940.

Aside from the current domestic and export demand for 44,900,000 barrels of gasoline in January, the bureau foresaw that the industry would accumulate 6,300,000 barrels in storage, as compared with the 7,500,000 barrels stored in January, 1940.

As the supplies to balance against the current domestic and export demand and the expected accumulation in storage, the Bureau of Mines foresaw benzol production and direct sales of natural gasoline in the amount of 1,500,000 barrels and refinery production that necessarily would total 49,700,000 barrels. Natural gasoline to be blended at refineries was estimated as 7.1 percent of the total refinery production, or 3,520,000 barrels, leaving 46,180,000 barrels to be produced as straight-run and cracked gasoline. On the basis of a yield of 42.6 percent, that production would require the running of 108,420,000 barrels of domestic and foreign crude to refinery stills, of 3,497,400 barrels daily.

Runs of foreign crude were estimated at 3,700,000 barrels for January, or 849,000 barrels higher than in January, 1940, and the remainder of the refinery requirements were indicated as coming necessarily from production or stocks of domestic crude. And in addition, crude oil required for export was estimated at 3,900,000 barrels, the same as the November and December forecasts, while crude oil to be used for fuel and losses was estimated as 2,700,000 barrels. Total demand for domestic crude oil in January was indicated by those figures as 111,320,000 barrels, or 3,591,000 daily.

Summary of Bureau of Mines Forecasts for January, 1941

(Barrels)

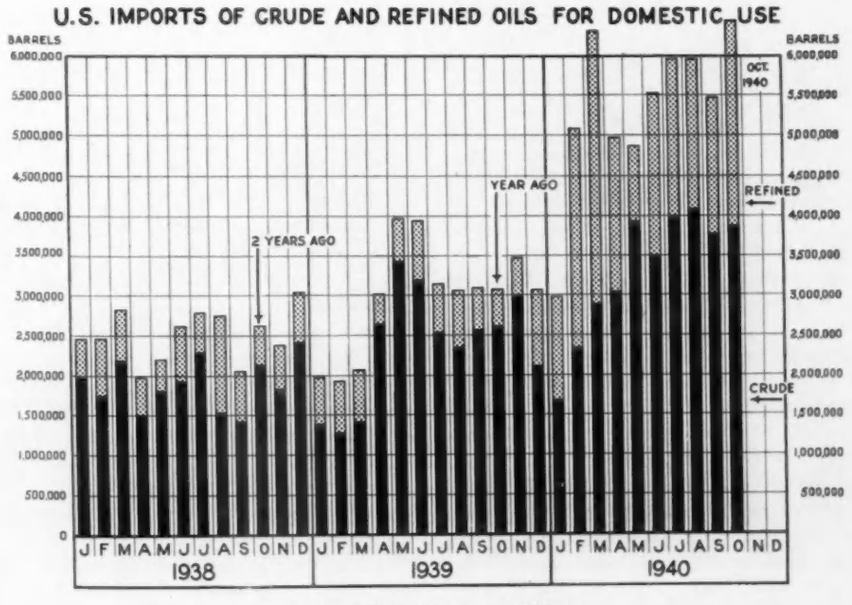
	Forecast January, 1941	Forecast December, 1940	Actual January, 1940	Percent Change for January, 1940-1941
Demand for Motor Fuel*:				
Domestic demand	43,000,000	46,400,000	40,370,000	+ 6.5
Exports	1,900,000	1,800,000	2,274,000	—16.4
	44,900,000	48,200,000	42,644,000	+ 5.3
Supply of Motor Fuel:				
Straight-run and cracked gasoline production	46,180,000	46,200,000	45,700,000	+ 1 0
Natural gasoline used at refineries	3,520,000	4,020,000	3,285,000	+ 7.1
Total refinery production	49,700,000	50,220,000	48,985,000	+ 1.4
Benzol and other natural gasoline	1,500,000	1,180,000	1,203,000	+24.7
Imports	.....	.....	18,000	.....
Decrease in finished stocks	.....	.....	.....	.....
Increase in finished stocks	6,300,000	3,200,000	7,562,000	—16.7
Available supply	44,900,000	48,200,000	42,644,000	+ 5.3
Crude Oil Requirements:				
Percent yield of gasoline from crude	42.59	43.00	42.90	— 0.7
Refinery crude required	108,420,000	107,460,000	106,530,000	+ 1.8
Daily average	3,497,400	3,466,500	3,436,500	+ 1.8
Foreign crude runs	3,700,000	3,600,000	2,851,000	+29.8
Exports	3,900,000	3,900,000	4,202,000	— 7 2
Fuel and losses	2,700,000	2,600,000	3,356,000	—19.5
Total demand for domestic crude	111,320,000	110,360,000	111,237,000	+ 0 1
Daily average	3,591,000	3,560,000	3,588,300	+ 0 1
Increase in domestic stocks	.....	.....	1,903,000	.....
Actual production	.....	.....	113,140,000	.....
Daily average	.....	.....	3,649,700	.....

* The term "Motor Fuel" as used in this report includes gasoline, naphtha, and benzol used for all purposes, but does not include heavier distillates used in the operation of tractors or burned in Diesel engines.

Oil Imports for Domestic Use Up Sharply

Figures indicate barrels and are from Bureau of Mines.

MONTH	Crude Oil	Refined Products	Total
January:			
Jan., 1939	1,373,000	609,000	1,982,000
Jan., 1940	1,664,000	1,321,000	2,985,000
Change	+21.2%	+117.1%	+52.0%
February:			
Feb., 1939	1,266,000	654,000	1,920,000
Feb., 1940	2,343,000	2,731,000	5,074.00
Change	+85.0%	+320.0%	+164.0%
March:			
Mar., 1939	1,404,000	659,000	2,063,000
Mar., 1940	2,895,000	3,410,000	6,305,00
Change	+106.2%	+417.4%	+205.6%
April:			
April, 1939	2,648,000	366,000	3,014,000
April, 1940	3,041,000	1,948,000	4,989,000
Change	+14.8%	+432.0%	+65.5%
May:			
May, 1939	3,434,000	529,000	3,963,000
May, 1940	3,921,000	934,000	4,855,000
Change	+14.2%	+76.5%	+22.5%
June:			
June, 1939	3,196,000	750,000	3,946,000
June, 1940	3,488,000	2,056,000	5,544,000
Change	+9.1%	+174.1%	+40.5%
July:			
July, 1939	2,539,000	608,000	3,147,000
July, 1940	3,981,000	2,000,000	5,981,000
Change	+56.8%	+228.9%	+90.0%
August:			
Aug., 1939	2,346,000	717,000	3,063,000
Aug., 1940	4,074,000	1,898,000	5,972,000
Change	+73.7%	+164.7%	+95.0%
September:			
Sept., 1939	2,553,000	541,000	3,094,000
Sept., 1940	3,772,000	1,712,000	5,484,000
Change	+47.1%	+216.5%	+77.2%
October:			
Oct., 1939	2,605,000	1,741,000	3,965,000
Oct., 1940	3,741,000	3,122,000	6,863,000
Change	+43.6%	+79.3%	+73.1%
1st 10 Months:			
1939	23,364,000	5,858,000	29,222,00
1940	32,920,000	21,052,000	53,972,000
Change	+40.9%	+259.4%	+84.7%



Source of Data: Bureau of Mines.

General View of Salt-Water Disposal Plant Serving Fitts Pool.

Subsurface Disposal of Oil Field Brines

By K. R. TEIS, Petroleum Engineer

RECENT years have brought about increased recognition of the economic and moral propriety of reducing, in so far as is practical, the destructive action of oil field brines. The result is that the disposal of salt water produced from oil wells has become a major problem of the producer. Common methods of brine disposal when considered on a basis of the ultimate disposition of the brine, may be classified as follows:

1. Uncontrolled surface runoff.
2. Controlled discharge to surface streams.
3. Impoundment in surface reservoirs.
4. Subsurface disposal.

Even a superficial study of the problem of brine disposal convinces one of the diversity of factors influencing the selection of the most suitable method of disposal for any given property or area. With conditions known and fundamentals applicable to the problem analyzed, an adequate and practical means of disposal can be proposed. A satisfactory disposal plant may be defined as one which makes possible final disposition of brine without appreciable damage to plant or animal life or to underground resources, at a cost which is economically justified. Physical elements comprising a complete brine disposal system might be listed as follows:

1. The oil separator.
2. The collecting system.
3. The treating plant.
4. The discharge system.
5. The disposal plant.

By far the most positive, and in many cases the most economical, method of brine disposal is that of input to deep wells. Without doubt the placement of brine in formations several hundred feet below the surface constitutes a permanent and certain means of disposal.

In considering underground disposal, for any particular area, the first consideration is the availability of a satisfactory input formation. Many times an abandoned or unprofitable oil well is at hand

which may be utilized, with little expenditure, as an input well. In most cases, however, it will be found necessary to work over the existing well, by cleaning out, plugging back, or drilling deeper, or perhaps it may be found advisable to drill a well from the surface.

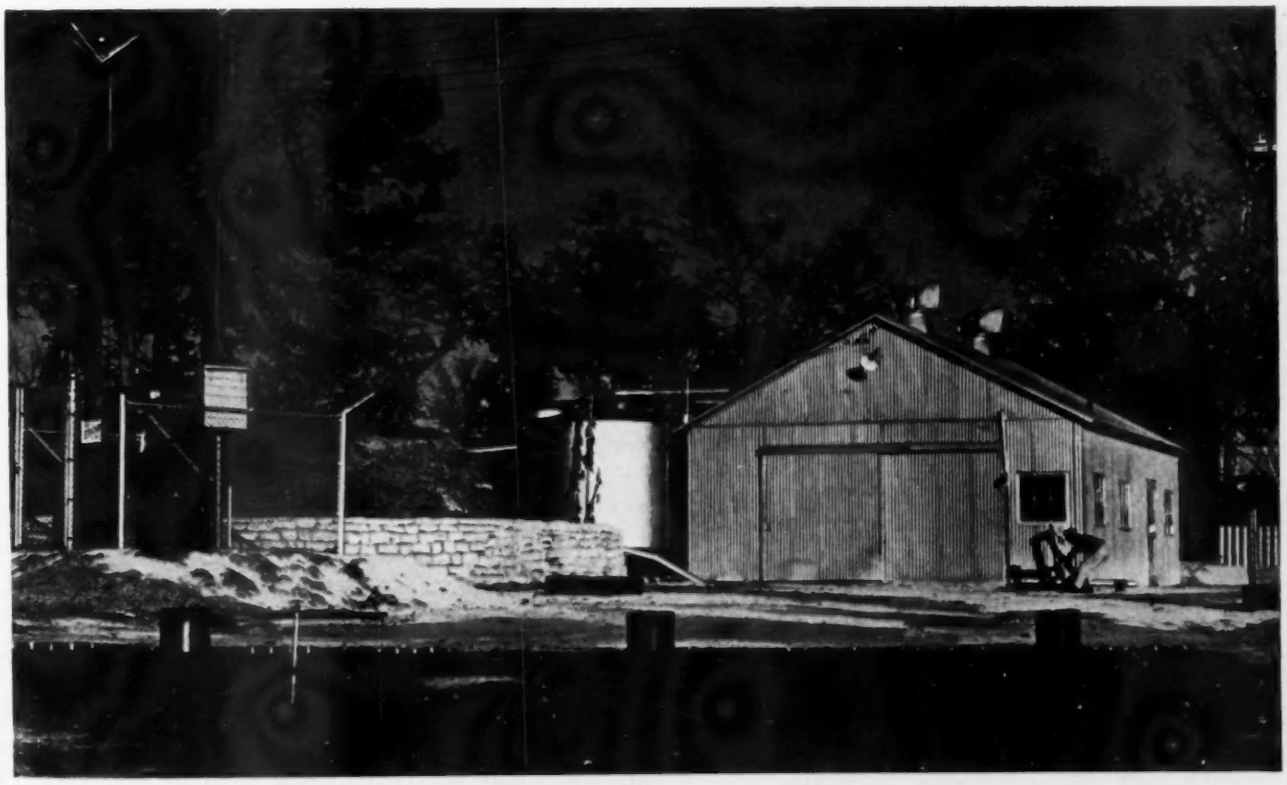
Theoretically the logical procedure in subsurface disposal is to return the brine to the formation from which it has come, or to other oil-producing formations so as to be effective as a water drive, thereby utilizing the disposal operation as a means of increasing the recovery of oil. Practically, however, this plan, though sound in principal, is somewhat difficult of application. Offset operators are usually loath to permit the injection of brine into formations from which they are producing oil, primarily because of the uncertainty as to the direction of movement of the injected water. In comparatively new fields it is seldom possible to secure an abandoned well sufficiently distant from producing areas to eliminate this objection. As a result the segregated location of the input well has in most cases made ineffective the water drive resulting from disposal operations. The future no doubt will bring about more careful planning of the development program of all pools, which together with increased cooperation among the operators of the pool, will result in more extensive application of combination disposal-water-drive operations. Under a unitized scheme of development the matter of brine disposal will have a definite place in the development program, and water will be returned to the producing formation in such a way as to aid in the movement of oil into the producing areas.

As stated above, the first consideration in a plan of underground disposal is the discovery of a suitable disposal well. It is customary, before proceeding to the construction of gathering and treating facilities to definitely prove, by adequate tests, the suitability of the input wells. The drilling of a well for salt water disposal is expensive and uncertain and preliminary investigation should be thorough. As the well must be located near to the producing area, reliable logs to the depth of the oil-producing formations usually are obtainable. A study of the various water-bearing sands should be made to determine both their geological and hydraulic characteristics. Structural conditions, sand thickness, porosity, permeability, depths, fluid content, reaction to acid, etc., are all important.

Consideration should be given to the possibility of utilizing existing unprofitable wells for input to the oil-producing zone, down dip, or to shallower or deeper zones by workover or deepening. Future operating expense depends, to a large degree, upon the efficiency of the input well. This justifies a thorough preliminary investigation.

Certain formations have been proven particularly suitable to brine disposal such as: the Silicious lime and Dakota formations of Western Kansas, the Bartlesville sand of Northern Oklahoma and Eastern Kansas and the Barstow sandstone in the Hendricks field, Texas. Operators in these areas no doubt would give first consideration to these zones. In some areas, the only clews to possible input zones must come from logs of existing wells or consideration of the general geological features of the area.

In order to obtain information regarding the disposal of brine through input to subsurface formations, the Mid-Continent Section AIME sent out questionnaires to numerous operators. Replies were received on 73 wells located in the states of Kansas and Okla-



High-Pressure Pumping Plant, Showing Filters and Suction Tank.

TABLE 1
Summary of Input Well Data

No. Wells Reported	Input Formation	General Area	Total Depth			Thickness of Input Section			INITIAL WELL INPUT RATES For Group					SINGLE WELL			WELL PERFORMANCES For Group		
			Max.	Min.	Av.	Max.	Min.	Av.	Max. B.P.D.	Surface Pressure	Min. B.P.D.	Surface Pressure	Av. B.P.D.	Surface Pressure	Max. Input B.P.D.	Pressure Lbs./ Sq. In.	Min. Input B.P.D.	Pressure Lbs./ Sq. In.	Accumulated Well Days	Barrels	Input per Well Day Barrels
15	Bartlesville Sand[1]	Kansas-Okla	1912	2975	2500	88	19	32	2204	0	25	0	635	0	208	0	5	0	12149	772,847	63.7
3	Dakota Sand[2]	Kansas	488	600	561	110	66	85	2640	30	175	200	...	...	1300	230	593	200	754	801,248	1060
3	Wilcox Sand[3]	Oklahoma	7464	4301	6220	95	5	83	720	0	27	0	313	0	2000	0	181	565	259	475,171	1650
18	Arbuckle[4]	Kansas	6446	2858	4080	1114	28	429	26000	0	500	100	...	...	17730	0	231	0	2540	39,308,856	3720
4	Viola Lime[5]	Kansas	1543	4234	3160	252	9	...	4300	0	....	...	...	...	1098	0	125	150	949	876,245	925
3	Wellington Salt[6]	Kansas	550	463	510	143	78	...	....	0	....	...	...	...	2082	40	60	0	1954	2,719,255	1390
3	Burbank Sand[7]	Oklahoma	3045	2865	2946	47	36	43	254	0	11	0	144	0	215	0	10	0	1558	191,693	120
2	Layton Sand[8]	Oklahoma	2043	1938	...	78	25	...	1320	175	288	0	...	...	142	0 to 150	21	0	668	39,197	.....
8	Salt Water Sand[9]	Oklahoma	400	782	630	17	50	25	780	325	150	0	...	...	780	480	10	450	612*	93,000†	.....
2	Dutcher Sands[10]	Oklahoma	2595	2894	....	27	26	....	....	....	....	....	...	...	60	0	10	0	495	13,950	28
3	Wilcox—Oil Creek[11]	Oklahoma	2462	2270	2322	620	500	571	14000	75	2900	310	...	...	11000	225	...	...	730	4,015,000	5500

[1] Gathering system closed—water settled and in some cases filtered—No chemical treatment—No costs reported—Low on account of conversion—Little water.

[2] Gathering system closed—water settled and filtered—No chemical treatment—Wells cost about $8,500.00—One plant reported $8,350.00—Operation—Two reporting—0.26 and 0.20 cents per barrel.

[3] Closed systems—two filter—one does not. Two kept costs—W&P $173,426.00, W-$16,000.00, P-$38,000.00. Operation .0113 cents and 0.7 cents.

[4] Closed systems—11; Settled—12; Filtered—9; Chemical treated—2.

Costs—		Min.	Max.	Av.
	5 W	$4,050.00	$40,000.00	$17,570.00
	5 F	1,500.00	20,000.00	12,710.00
	8 W&P	10,681.00	38,000.00	26,200.00
	12 O	0.1	2.00	0.374¢

[5] 1 open, 1 closed, 1 filtered, 1 reporting costs—W-$23,088.00, P-$8,150.00, Operation 0.125 cents per barrel.

[6] 1 closed, 1 filtered. Well $1,200.00, 1 Grav.—2 at low pressure.

[7] 2 closed. No treatment. Wells, 2 at $300.00; 1 at $2,069.00. Operation less than 1 cent per barrel.

[8] Both closed—1 filtered—W&P $8,726.00 and $8,200.00. Operation estimated less than 1 cent per barrel.

[9] * Two wells—13 wells, with one at $2,000.00, one at $1,350.00. P-1 at $350.00.

[10] Closed systems—No treating.

[11] Open system—settling—mech. filtering. Wells cost about $15,000.00—Plant about $210,000.00. Operation 0.5 cents.

W-Well, P-Plant, W&P-Well and Plant. O-Operation.

homa. The information contained in these questionnaires is set out in Table 1.

Subsurface disposal of brine is more prevalent in Kansas than in any other producing area. Two factors have contributed largely to this. The Arbuckle lime formation of Western Kansas and the Bartlesville sand of Eastern Kansas have provided adequate disposal reservoirs. The Silicious, fortunately, has great capacity to receive brine, this formation prevailing over areas where brine production is high. The Bartlesville sand, while having much less input capacity, is available in areas where oil-producing wells make little water. As a result, disposal can be accomplished at relatively low cost. The second factor contributing to successful brine-disposal operations in Kansas has been the understanding and practical attitude of the Kansas State Board of Health towards the problem. This body through its Director Earnest Boyce, working with the United States Bureau of Mines, has made very material contributions to solution of the problem of brine disposal. Through a cooperative agreement between the two departments, engineering investigations have been carried out which have stimulated disposal activities and directed the work along practical lines. As a result of these studies and the natural suitability of the Silicious lime and the Bartlesville sand formations, disposal of brine in Kansas has been more efficiently carried out than in any other general oil producing area of the Mid-Continent.

Other state regulatory bodies might very well profit by the example of the Kansas board. Practical, constructive, intelligent assistance in the solution of the problem of brine disposal will be far more productive of satisfactory results than will the now prevalent harrassment of the oil producer through prohibitive regulations and criminal prosecution. The problem can be solved only through the intelligent application of engineering principles, and no amount of vigilence on the part of health officials and game wardens will induce certain operators to take substantial corrective measures which they are now convinced are impractical. The state officials charged with the regulation of oil field pollution should be technically trained men who are sufficiently familiar with the engineering aspects of brine disposal and with oil-producing operations to be able to render constructive assistance in working out practical solutions to the problem. This type of personnel, working through proper enabling legislation, is certain to reduce pollution damage far below that possible under an unintelligent though forceful program of criminal prosecution.

The character and performance of the 73 input operations reported are so varied as to discourage one in advancing specific conclusions. It is noted that the entire group of wells has accounted for the disposal of almost 50 million barrels of brine. The 18 Arbuckle lime wells have by far the greatest total and individual input capacity. One well is reported to have taken water at an average rate of 17,730 barrels per day for periods of 600 days; a total of more than 10,000,000 barrels. The Arbuckle group averages more than 3700 barrels per day per well, daily input. Of the 18 Arbuckle wells reporting, 11 are receiving water from closed systems. In 12 the water is settled; in 9 filtered; in only 2 is the brine chemically treated. Cost of wells vary from $4,000 to $40,000; collecting and treating plant investment from $1,500 to $20,000; operating costs from 0.1 to 2 cents

per barrel. Practically all of the wells were abandoned oil wells converted to input service by deepening and clean out. Two were given acid treatment.

The second largest group of wells reported are the Bartlesville sand wells—15 in number, with an accumulated total input of only 772,857 barrels. All these wells are reported as taking the brine under vacuum so that their potential capacity is not indicated. Being located in areas of little brine production they are not required to absorb large volumes, as are the Arbuckle wells. Gathering systems serving these wells are of the closed type, water is settled and in some cases filtered, no chemical treatment is used. No costs are reported but are probably comparatively low per well, as practically all are converted oil wells. Unit costs per barrel of disposal however probably would be higher than in the cases of the Arbuckle wells due to low input rates.

Study of the report indicates that elaborate treating plants are not justified where highly permeable input zones are available or where low rates of input are expected. However, disposal of large quantities of brine to deep wells having relatively tight or thin formations, in some cases, require careful treatment of the brine to insure economical input operations.

The capacity of an input well to take brine depends upon several factors, principal of which are: the permeability of the receiving sand, its thickness, and the pressure differential between sand face and the formation. It is quite likely, that in many cases, this difference in pressure may be gained more economically by input to deeper formations, than by the application of high surface input pressures to shallower formations.

Pumping of brine at high pressures is an expensive operation and is to be avoided where possible.

Table 2 itemizing operating costs of the communitized disposal plant in the Fitts pool is of interest.

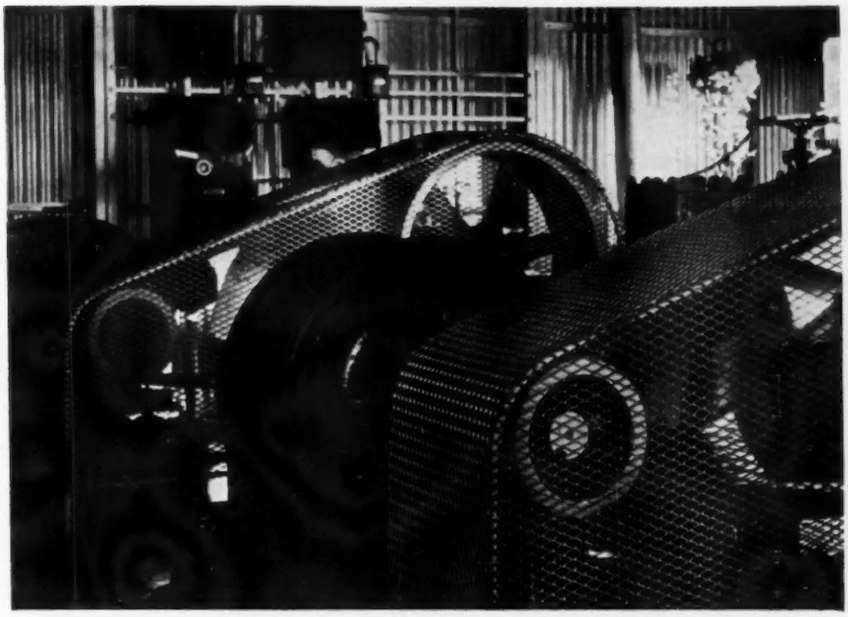
Constructional Features of Brine Disposal Plants

Design of an efficient brine-disposal plant often involves application of a wide range of engineering practice, embracing the fields of civil, mechanical, petroleum, and even chemical engineering. It is not the intention here to attempt a comprehensive treatment of this phase of the subject. It is hoped that brief discussion of some of the more important features of design will prove helpful. In general the complete brine disposal plant will consist of the following units:

1. Oil-brine separator at the oil well.
2. System of gathering and conducting pipe lines.
3. Storage reservoirs.
4. Treating plant.
5. Pumping plant.
6. Discharge line.
7. Disposal plant.

First concern is with the initial separation of oil and water at the oil-producing well. This may involve consideration of treatment of oil-water emulsions; a subject beyond the scope of this paper. With the best of treating procedure, on the part of the oil producer, the brine reaching the gathering lines of the brine-disposal system will contain some oil. Various degrees of treatment at the well may be necessary, depending upon the effect the oil and suspended matter might be expected to have on the life and carrying capacity of the gathering system.

Injury to certain types of joint compounds, or even to the material composing the pipe may result from excessive amounts of oil in the brine. Appreciable amounts of sediment, resulting from floating sand conditions in the well, or to corrosive action of the brine on well piping, may bring about restriction of gravity flow lines. Excessive temperature of waters discharged from lease treating plants may also be harmful. These things may make necessary the installation of an auxiliary oil-water separator and sedimentation tank at the well, and in some cases facilities for cooling the brine, previous



Interior View of High-Pressure Pumping Plant.

TABLE 2
Operating Expense—Fitts Pool Disposal Plant

MONTH	Electric Power	Labor	High Pressure Pump Repairs	Lubrication	Other Plant Expense	Plant Expense Total	Total Operating Expense Gathering and Disposal	Barrels Disposed of
May, 1938	$381.65	$436.50	$101.76	$28.95	$164.92	$1,113.78	$1,957.20	230,631
June	450.95	381.00	10.48	.16	18.22	860.81	2,060.21	231,919
July	390.60	192.00	19.12	.....	21.38	623.10	2,094.16	306,837
August	456.83	187.50	18.71	.....	52.20	715.24	2,119.67	319,692
September	561.00	150.00	10.82	27.45	8.46	757.73	1,612.66	346,899
October	607.53	150.00	25.52	.....	44.49	827.54	1,662.03	346,036
November	692.54	160.00	110.23	.....	11.46	974.23	1,958.19	327,300
December	667.73	160.00	108.06	.....	67.71	1,005.50	2,663.68	358,732
January, 1939	686.38	160.00	51.44	.....	76.98	974.80	1,834.84	355,911
February	657.07	160.00	520.38	.....	381.35	1,718.80	2,467.45	332,472
March	773.63	160.00	114.66	.....	14.67	1,062.96	1,839.33	385,222
April	817.00	160.00	227.47	.....	12.25	1,216.72	1,970.50	390,690
Total	$7,142.91	$2,457.00	$1,318.65	$56.56	$876.09	$11,851.21	$24,255.92	3,932,341
Unit Cost Mills	1.82	0.65	0.34	.....	0.224	3.2	6.17	.....

Amortization of plant investment over a ten-year period with interest rate at 4 percent the total disposal cost of the Fitts operation is expected to approximate 1½ cents per barrel of brine disposed of.

to its entrance into the gathering system.

Collecting and treating plants may be grouped under two general classifications — open and closed. In the open system, no effort is made to prevent contact of the brine with the atmosphere, while the closed system is designed with the idea of preventing contact between the brine and the air, keeping the brine under pressure in so far as is possible. Preventing the brine from coming in contact with excessive amounts of air reduces precipitation of carbonates, resulting from escape of carbon dioxide. Wilhelm, Thorn and Pryor[1] cite tests made on six samples of Silicious brine which indicate that a precipitation of approximately 150 pounds of carbonates per 1000 barrels of water may result from aeration of Silicious lime brine.

The relative merits of the open and closed methods of handling brine, including discussion of typical plant installation has been capably treated by Taylor, Wilhelm and Hallimon.[2] The matter of treatment of brine preparatory to subsurface injection is one phase of the brine-disposal problem which requires further study and experimentation. The complex nature of the brine solutions common to oil-bearing formations makes analysis extremely difficult. Most of the plants which have been constructed for the purpose of treating brine are still considered as experimental projects. It is likely that only a few of the several which have been built have definitely proven their worth.

The essential features of the closed-type system as now practiced include collection and injection of brine carried out without contact with atmosphere, preferably under pressure; supersaturation of carbonates minimized by addition of hydrochloric acid, carbon dioxide or hydrogen sulphide; filtering under pressure; and, conduct to input well through corrosion-resistant pipe.

Operation of an open-type system consists of removal of hydrogen sulphide and carbon dioxide gasses by aeration; stabilization by contact with calcium carbonate sludge; settling and filtering to remove suspended matter; and, conduct to input well through corrosion-resistant pipe.

Choice between the two methods of treatment or decision as to the advisability of using any elaborate treatment at all must be considered in the light of specific circumstances. In several input plants chemical treatment has been discontinued after trial, and many input operations are carried out satisfactorily with little processing other than settling and filtering.

The system of piping which conducts the brine to the place of disposal, or to the treating plant, may be gravity or pressure type. It is advisable, where possible to utilize gravity flow in the collecting system, for the reason that it permits the use of less expensive conduits, and eliminates the somewhat costly operation of pumping the brine. The gravity system, however, does not lend itself to the closed-type of operation. Costs of a pressure gathering system with closed operation must be balanced against the lower first cost of gravity collection, plus the possibility of more elaborate brine treatment.

The use of non-corrosive pipe in brine gathering systems is almost a necessity. Not only is the cost of maintaining the system reduced thereby but the formation of metal oxides, which require removal before input, are eliminated.

Types of corrosion-resistant conduits most commonly used in brine disposal operations are pitch-impregnated wood fiber conduit, salt-glazed vitrified clay sewer pipe, concrete pipe, cement-asbestos pipe, or cement-lined steel pipe. They increase in price in the order named as also in their ability to withstand pressure.

The most suitable type of material for any particular installation depends on several considerations such as pressure conditions, nature of topography and soil, risk contingent on escape of brine, and anticipated life of system. If the line will be required to handle brine under pressure, as in the case of pumping or application of the closed-type of system, the first three classes of pipe are not acceptable. They are also not suited to use where escape of small quantities of brine due to parting of the line or to minor joint leaks are apt to result in major damage. Being practically unsalvageable, their cost though comparatively low may make their use uneconomical for short time service. It is doubtful if an entirely satisfactory joint has yet been developed for use on the vitrified clay and concrete pipe. The various types of joints commonly used in sanitary sewer construction such as: cement grout, bituminous cement and sulphur base compounds; each has its inherent weakness. The cement grout shrinks from the pipe, causing leakage, the bituminous joint is affected by oil and temperature, and the sulphur base joint, while tight and unaffected by oil or heat, forms such a rigid joint as to induce structural failure of the pipe. It is the writer's opinion that where relatively firm soil conditions obtain, satisfactory joints can be produced with the sulphur compound, provided the pipe is properly bedded and the backfill thoroughly tamped below the spring line of the pipe.

The use of cement-asbestos pipe is indicated where the hazard of leaks is execessive, and is necessary where moderate pressures are expected. For high-pressure use and for maximum safety against leaks, the cement-lined steel pipe is best suited. The future development of better pipe materials for transportation of oil-field brines is probable. Little attention has been given to the matter of joining concrete and clay pipe for this service. The low cost of these materials make their use particularly inviting, provided this objection can be overcome. The wood-fiber pipe was developed for electrical conduit service and has been adopted to brine disposal use with little consideration given to its betterment for this quite different service.

The economic factors in the design of a brine-collecting system are all important. The use of expensive materials carrying highest factors of safety may not always be most economical. It is possible to be influenced too strongly by the desire to make the system absolutely water tight. In disposal operations in the usual oil field, some leakage and escape of brine is certain to occur. In certain instances doubling the cost of a gathering system in order to establish an uncertain factor of safety may not be economically justified. The lower the grade of material the more necessary it becomes to obtain high grade workmanship in this type of construction. The use of the less costly grades of pipe bring an added responsibility in the matters of both design and construction.

In a gravity collecting system serving a number of leases the general design is comparable to that of a sanitary sewer system.

[1] Disposal of Oil-Field Brines in the Arkansas River Drainage Areas U.S.B.M.-RI 3318.
[2] Typical Oil-Field Brine-Conditioning Systems-RI 3434.

Beginning at the up-hill leases the various laterals and mains converge in increasing diameters to the point of assembly—usually a retention reservoir of sufficient capacity to hold several days' production of brine.

The most satisfactory and economical type of retention reservoir is the concrete-lined earthen pit. Provision should be made therein for separation of oil which is sure to be present in the brine.

The extent and nature of treatment which should be given the brine prior to subsurface input depends upon many factors, several of which are difficult of determination. Oil-field brines are complex solutions containing many ionic compounds the character of which are not well understood. The ionic components of these complex solutions are assumed to be in equilibrium in the virgin formation, however, the changes in temperature and pressure, resulting from movement of the brine to the surface, may upset the equalibria of the solution, resulting in the liberation of dissolved gasses, with precipitation of carbonates and sulphates of calcium and magnesium. The precipitates, if not removed from the brine, bring about clogging of the face of the receiving formation.

The degree and character of the treatment justified in any specific case depends largely upon economic considerations. The cost of conditioning the brine must be balanced against the expense and frequency of repairs to the receiving well or wells which is expected to result from input of untreated or partially treated brine. Due to the lack of extensive experience, it is difficult to predict the degree to which an input formation might be damaged as a result of not treating the brine. Where a small quantity of water is produced from a few wells the most economical procedure is the use of the closed system with settling and perhaps filteration. The disposal of large volumes of brine into deep wells having comparatively tight sand sections calls for greater attention to the matter of conditioning the brine.

No attempt will be made, in this paper, to treat the subject of brine-conditioning in detail. The subject is quite capably discussed by Taylor, Wilhelm and Hallimon in Bureau of Mines Bulletin R.I. 3434. However, it will dwell briefly on the general features of the problem, describing the type of equipment employed.

Section of Cement-Asbestos Gravity-Flow Line and Concrete Supports.

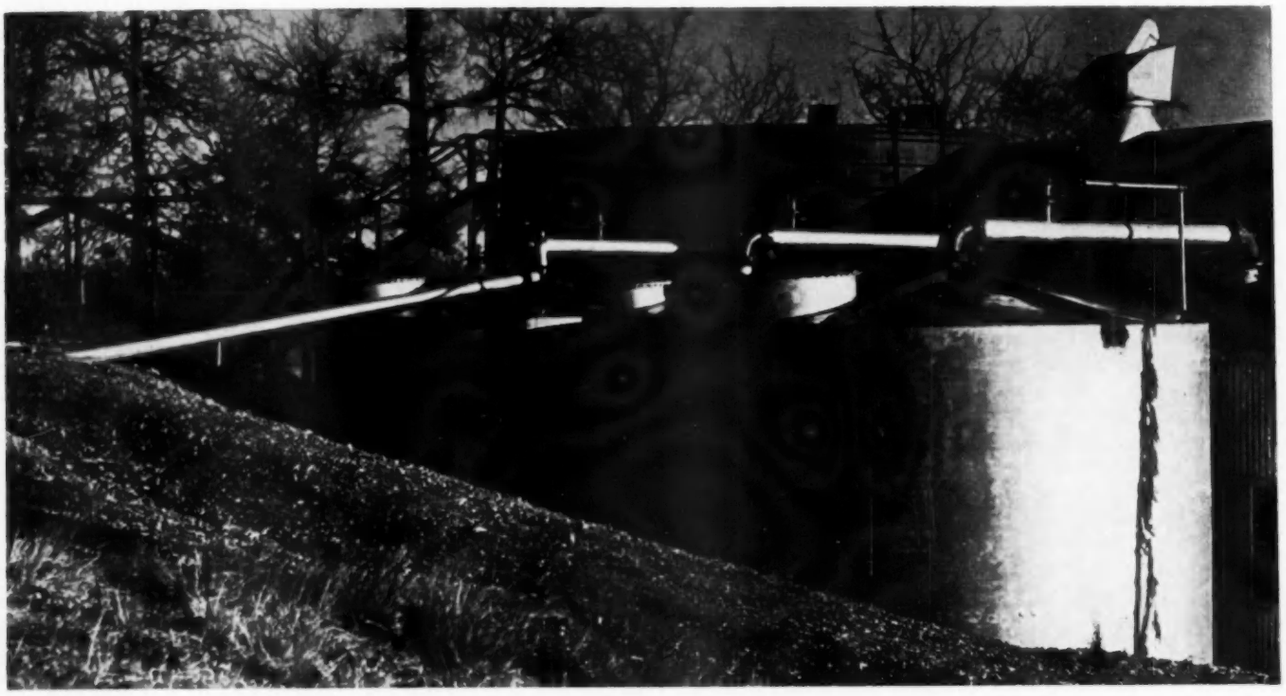
The equipment described is capable of rendering complete treatment as now generally applied. Certain of the processes may be dispensed with in specific instances. Conditioning of brine may include parts or all of the following processes:

1. Aeration.
2. Chemical treatment.
3. Sedimentation.
4. Filtering.

Aeration serves to remove the hydrogen sulphide and carbon dioxide gasses, present in some brines. It is applicable only to the open-type system of disposal. Various methods of areation have been employed: by flow of brine over weirs or over cascaded structures; by forcing through spray nozzles; by dropping downward through a series of perforated or slatted trays, or by bubbling with compressed air. Any of these methods are effective if properly applied, the conditions at the particular location dictating the type of installation.

Chemical treatment may or may not be used. In the closed-type system a super-saturation of carbonates may be minimized by the addition of measured quantities of hydrochloric acid. While this method of treatment has not been widely used it would appear to have possibilities where economically justified.

Since the closed-type of operation attempts to retain the stability of the brine as existant in the reservoir; little or no chemical treatment is indicated for this type of disposal when properly carried out. In the open-type system or the imperfect closed-type of operation, however, the stability of the brine is apt to be so disturbed that precipitation of carbonates results, requiring chemical treatment. The usual procedure consists of aeration to remove the dissolved gasses, and contact of the brine with a calcium carbonate sludge to



Rear View of High-Pressure Pumping Plant, Showing Pressure Filters and Pump Suction Tank (in Rear).

remove the excess carbonates followed by filtering.

The contacting of the brine with the calcium carbonate sludge may be carried out in one of several types of reaction tanks. Since stabilization of the brine is hastened by agitation it may be found advisable to provide mechanical means for stirring the brine or for rolling the contents of the reaction tank with air. The latter procedure functions both as aeration and agitation.

The economical advisability of chemical treatment of the brine in any particular case is a nice problem. There appears to be a definite trend towards less elaborate treatment and the use of simple inexpensive equipment. In many cases it will be found less expensive to carry on input operations with a minimum of treatment, repairing the resulting damage to the well by regular clean-out or acid treatments, or even in the case of shallow wells, the drilling of additional wells, rather than to subject the brine to costly chemical processing. This course would appear to have particular merit in cases where the results on non-treatment of the brine is uncertain, as is usually the case in the early life of a disposal operation.

Primary sedimentation may be carried out in the retention pit from whence the brine is conducted either by pump or gravity to the filters or in some cases coagulation with secondary sedimentation is indicated. Filters are of several types. Sand filters, both gravity and pressure, are used extensively. One major company uses cloth filters exclusively. The carborundum tube filter has also been employed in a few installations.

The filtration of brine is not essentially different from the treatment given domestic water supplies, on which subject a vast amount of technical data is available. The essential difference between the pressure- and gravity-type sand filters is in the rate of passage of the water through the filtering bed, and the method of cleaning the sand. Both types depend upon the straining action of a specially graded sand bed. Selection of the sand is most important, usually necessitating rather close gradation by screening. Rates approximate 2.0 gallons per square foot per minute for the pressure filter and about .05 gallons per square foot per minute for the gravity type. Thus a sand bed area of 14.6 square feet would be required for the pressure type and some 580 square feet for the gravity type per 1000 barrels per day input.

Pressure filters are usually cleaned by reversing the direction of flow through the filtering sand, thus displacing the retained dirt which has collected during the period of operation. The gravity type, or sand filters, as they are generally termed, are cleaned by removal of the upper surface of the filter sand bed, replacing the material removed, with clean sand.

It may be more practical in many cases, to pump directly from the brine retention pit or sedimentation chamber, through a pressure-type filter, into the receiving well. The pressure filter is believed to be more easy of efficient operation, since its performance is more readily determinable through the use of rate of flow indicators and differential pressure gauges.

The following conclusions derived from tests made on pressure sand filters are those reached by Sam S. Taylor and L. F. Christianson of the U. S. Bureau of Mines as reported in Bulletin R. I. 3334; Titled: Application of Sand Filters to Oil Field Disposal Systems:

1. *Construction of Sand Filters.*
   a. An effective sand size of 0.59 mm and a uniformity coefficient of 1.79 is recommended.
   b. A sand bed depth of 24 inches proved to be adequate for filtering suspended matter from brine.
   c. A vertical distance of 10 inches from the expanded sand layer to the collecting system will prevent loss of filter sand and allow thorough removal of suspended material under proper backwash conditions.
   d. Some type of effluent regulation is necessary to maintain efficient filtration because a constant rate of filtration is desirable.
   e. Only a negligible quantity of oil should reach the filter.
2. *Operation of Filter.*
   a. A rate of filtration of 2.5 gallons per minute per square foot

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of filter area has the most practical qualities with regard to economics, duration of filter run, and filter efficiency. At this rate, a filter constructed with a sand bed depth of 24 inches will remove as much as 95 percent of the insoluable iron from the brine.

b. A back-wash rate of 15 gallons per minute per square foot of filter area, continued for 10 minutes was found to be adequate for cleaning the sand in the filter.

3. *Results of Chemical Determination.*

a. Chemical analysis show that filtration affects the constituents of the brine as follows: The hydrogen-sulphide content is not changed appreciably and the hydrogen-ion concentration of the brine remains constant, but the chemical balance of the carbonates is altered definitely.

b. Brine analysis made 5 minutes after sampling indicate that dissolved oxygen does not exist in a brine that contains a high concentration of hydrogen sulphide.

Organization and Control of Joint Disposal Operations

A definite trend towards communitized salt water disposal operations, has developed in the last few years. The problem of brine disposal is one which is common to all the producers in a pool. The success of individual efforts, is largely dependent, at least in an economic sense, upon the effectiveness with which escape of brine is prevented within the entire producing area or water-shed.

The unit cost of brine disposal for each producing well is materially reduced under a comprehensive plan of disposal. Duplication of gathering, treating, and disposal facilities are largely eliminated by a well planned common system. Costs of operation are also cut to a minimum. Thus it is often found advisable to create an association of producers for the purpose of disposing of oil-field brine. Several such associations have been formed, in the early life of recently developed pools, in the Mid-Continent area, the latest of which is the Fitts Pool Salt Water Disposal Association. An outline of the more important features of this organization might be of interest.

From the early development of the Fitts pool the problem of brine disposal was given consideration. Upon recommendation of the Fitts Pool Engineering Committee, a plant was constructed capable of handling brine from the majority of leases in the pool. The project was built and is now operated under a form of agreement which includes the best features of several similar pool agreements. The substance of this agreement is given below:

1. Purpose of Association defined to construct, operate, maintain a salt water disposal system.

2. Association to be governed by a governing committee, composed of one representative from each participating company, which shall have supervision of the construction and operation of the system, subject, however, to a ¾ vote of the membership.

a. Voting weight of members of the committee to be proportional to the investment made in the system by the member's company.

3. Operation of system directly in charge of one member company.

a. Expenditures exceeding $2500.00 must be approved by the committee.

4. Area included in project defined.

5. System to consist of, laterals from members' leases to main collecting system, main collecting drains, pumping, treating, and storage facilities, pressure discharge lines and input wells.

a. Members to provide lease storage, at own expense.

6. Operating Regulations.

a. Number of employees to operate system, selection thereof, and salaries are to be determined by operator; subject to 2/3 vote of committee.

b. Operator, its agents and employees, granted right of ingress to and egress from all lands included in leases of members, for purposes incident to operation of system.

c. Association agrees to accept and dispose of all salt water produced by members, within the defined area, up to the capacity of the system, but shall not be obligated to accept more than 1500 barrels from any one well.

d. Members agree that they will each dispose of all salt water produced by them within the defined area.

e. If capacity of system is exceeded, operator shall apportion available capacity among members in a manner in which, in his judgment, will result in the least amount of damage. Damage resulting from lack of capacity of system, will be borne by the association.

f. Claims for damage, resulting from operation of the system shall be settled by the operator, subject to approval of the committee. Cost to be borne by the association.

7. Investment Cost of System.

a. Investment costs to be distributed as follows:

1. 25 percent prorated among members as follows: Member operating eight or more wells shall pay 1 equal share; members operating 4 or more wells but less than 8 shall pay ½ share and members operating less than four wells shall pay ¼ share.

2. 75 percent prorated in proportion to the number of producing wells of the member bears to the total number of producing wells operated by all members of the association.

8. Operating Expense.

a. Operating expenses shall be prorated as follows:

1. 25 percent as specified above for distribution of investment cost.

2. 75 percent in proportion to the number of units, (hereinafter explained), each member operated during the month bears to the total number of units operated by all the members. The number of units operated is determined as follows:

A well producing an average of 300 barrels or less shall be one unit; 300 to 600 barrels two units, 600 to 1000 barrels three units, 1000 to 1500 barrels four units and in excess of 1500 barrels, five units.

9. Miscellaneous Provisions.

a. Upon discontinuance of the association property shall be sold under direction of the committee and the receipts distributed proportionately to the contribution to each member to the investment cost.

b. Any member may withdraw from the association but shall forfeit his entire investment in the system.

10. Accounting Schedule. The provision of this schedule will not be detailed in this paper. Briefly it incorporates accounting procedure as followed in standard oil and gas partnership accounting. It would appear advisable to set these matters out in considerable detail in the agreement in order to avoid controversy.

Cooperative disposal schemes have worked out well in the several fields in which they are in operation. It is possible under such a plan to more competently design and construct the disposal plant, and since operation of a disposal system seldom requires a large operating personnel, material savings in labor are realized through joint operation.

Conclusions

Subsurface disposal of brine appears to offer most postive, and in many cases, the most economical means of disposal.

Utilization of brine input as a means of water flood will become more common. Greater effort on the part of pool operators to bring about this type of operation is recommended.

The problem of selecting a subsurface formation for the reception of brine is one of great complexity and warrants the highest type of technical investigation.

The manner in which brine is treated and the degree to which treatment is carried, prior to subsurface disposal, is dependent upon purely economic considerations. In most cases complete chemical treatment of brine is not justified.

Material reduction in the damage now resulting from escape of oil-field wastes would come from a cooperative approach to the problem, on the part of government regulatory and enforcement officers.

The problem of brine disposal is one common to all those operating upon a common water-shed, this being true a unified plan of regulation and disposal is highly desirable.

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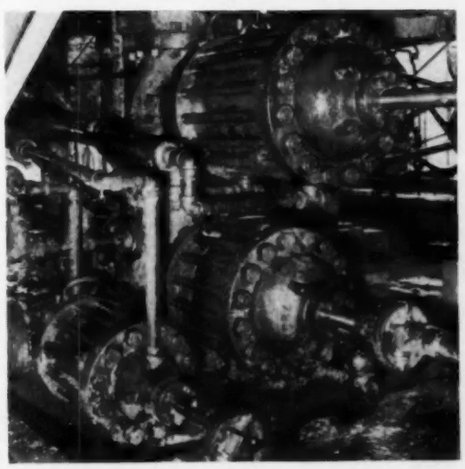

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Deviation of Natural Gas From Ideal Gas Laws

By GEORGE GRANGER BROWN
University of Michigan

THERE are many uses that can be made of the compressibility factor (which was explained in the preceding installment published last week) in determining the properties of gases under pressure. One application that may be of interest is in calculating bottom hole, or formation pressures in gas wells and in calculating gas reserves in a constant volume reservoir from surface data.

Gas Formation Pressure

If the gas density is known as a function of pressure and temperature, the gas formation pressure may be calculated from the shut-in equilibrium casinghead pressure.

Reference to Figure 6* indicates that the pseudo-critical temperature for most natural gases is in the neighborhood of 375° absolute, so that the pseudo-reduced temperature of such a gas when in a well would vary from about 1.4 to 1.6 corresponding to temperatures from 60° F. to 140° F. Similarly from Figure 5* if the absolute pressure is between 1200 and 3300 pounds per square inch, the pseudo-reduced pressure would be between about 2 and 5. Over this range of reduced temperature and pressure, the value for Z as indicated in Figure 4* is reasonably constant for any reduced temperature so that a single value for Z taken at the average temperature and pressure of the gas in the well may be used as an average value of Z in equation 1 for computing the density of the gas in the well.

Illustration 6. Compute the bottom hole or formation pressure, from the following data:

Specific gravity of gas (air = 1)	0.680
Molecular weight = 28.9 × 0.68 =	19.7
Shut-in casinghead pressure	1900 p.s.i. abs.
Casing elevation above sea	4100 feet
Depth of well (2200 ft. subsea)	6300 feet
Average temperature	80°F. (540° Abs.)

Computations:

From Fig. 5, pseudo-critical pressure = 668 p.s.i. abs.
From Fig. 6, pseudo-critical temp. = 380° abs.

$$\text{Pseudo-reduced temp. at } 80°\text{F.} = \frac{460+80}{380} = 1.42$$

$$\text{Pseudo-reduced pressure at 1900 p.s.i. abs.} = \frac{1900}{668} = 2.85$$

Z at $T_r = 1.42$ and $P_r = 2.85$ from Figure 4 = 0.725

As the pressure increases, the value for Z decreases very slightly, less than one percent and the value of 0.725 may be used as an average value for the entire depth. In other cases when Z might change more with depth or pressure an estimated average can be used in the same manner.

*See preceding installment.

The increase in pressure from casinghead to bottom of hole in pounds per square inch, equals the density of the gas in pounds per cubic foot for conditions of average temperature and pressure between casinghead and bottom, times depth in feet, divided by 144.

ΔP = Pressure at bottom — Pressure at casinghead

$$\text{density} = \frac{1}{V} = \frac{P}{ZNRT} = \frac{1900 + \frac{\Delta P}{2}}{0.725 \times \frac{1}{19.7} \times 10.71 \times 540}$$

$$= 0.00474\left(1900 + \frac{\Delta P}{2}\right)$$

$$\Delta P = \frac{\text{density} \times \text{depth}}{144} = \frac{0.00474\left(1900 + \frac{\Delta P}{2}\right) 6300}{144}$$

$$\Delta P = 0.208\left(1900 + \frac{\Delta P}{2}\right) = 395 + 0.104\,\Delta P$$

$\Delta P = 441$ p.s.i.

Therefore the bottom hole pressure is 1900 + 441 or 2341 pounds per square inch absolute.

The method just outlined has been checked against numerous measurements of bottom hole pressures in gas wells and found to agree closely in all cases.

Calculating Gas Reserves (Illustration 7)

If the quantity of gas produced over definite time intervals is known, and the formation pressure can be computed at the beginning and end of each time interval, the gas reserves and the pressure drop accompanying further production may be calculated with satisfactory accuracy by the method outlined in Table 4.

The first 10 lines in Table 4 are self-explanatory in view of previous descriptions. The number of standard cubic feet of gas in one cubic foot of pore space in the reservoir, line 11, is computed as follows: The volume of one pound molecular weight (N = 1) of the gas at standard conditions (60° F. and 14.65 p.s.i.) is computed from equation 1 as 379 cubic feet. The volume of one pound molecular weight (N = 1) of the gas under reservoir conditions is

$$V = \frac{ZRT}{P} = RT\left(\frac{Z}{P}\right) = 10.71 \times 570\left(\frac{Z}{P}\right) = 6100\left(\frac{Z}{P}\right)$$

The number of standard cubic feet in one cubic foot of pore space is

$$379 \div \left[6100\left(\frac{Z}{P}\right)\right] \text{ or}$$

$$\frac{379}{6100} \times \left(\frac{P}{Z}\right) = 0.062\left(\frac{P}{Z}\right)$$

Line 12, values for gas released per cubic foot of pore space are obtained by substracting the values of line 11 from the original value of 159.4 in line 11.
Line 13, values for total cubic feet of pore space are ob-

tained by dividing total gas produced shown in line 5 by total gas released per cubic foot of pore space as given in line 12.

Line 14, calculated initial reserve at 2000 pounds per square inch is obtained by multiplying total pore space, as given in line 13, by the initial value for standard cubic foot of gas in one cubic foot of pore space, 159.4.

Line 15, current reserve is computed by subtracting total production to date, line 5, from line 14.

Prediction of Pressure Decline Curve

The same methods may be applied to the prediction of the quantity of gas that will be produced by the time the formation pressure has declined to predetermined figure. The only difference is that the pore space must be calculated by a few tests as set forth in Illustration 7 (Table 4) in order to arrive at a satisfactory value for the pore space on which to base subsequent calculations.

An average of the pore space computed in the last three tests of Illustration 7 (line 13) is approximately 6.4 billions cubic feet. Using this value, the total gas production when the formation pressure has declined to 500 p.s.i. absolute may be computed as follows:

Illustration 8 using the data of Illustration 7 as set forth in Table 5 compute the total gas production when formation pressure is 500 p.s.i. absolute.

Pseudo reduced pressure in reservoir $= \frac{500}{668} = 0.75$

Pseudo reduced temperature in reservoir $= 1.5$

Compressibility, Z, at reservoir conditions (Fig. 4) $= 0.925$

St. cu. ft. gas in one cu. ft. pore space, $0.062 \frac{P}{Z} = 33.5$

Billions cu. ft. of pore space (previously calculated) $= 6.4$

Billions st. cu. ft. of gas left in reservoir at 500 p.s.i. pressure (current reserve) $= 33.5 \times 6.4 = 215$

Billions st. cu. ft. initial reserve $= 159.4 \times 6.4 = 1020$

Billions st. cu. ft. total production to 500 p.s.i. reservoir pressure $= 1020 - 215 = 805$

Billions st. cu. ft. produced as reservoir pressure drops from 660 to 500 p.s.i. $= 805 - 704 = 65$

Accuracy of these last calculations of pressure decline depends upon a reliable calculation of pore space. Frequently three or more calculations of pore space similar to the four calculations outlined in Illustration 7 may be required before satisfactory check results are obtained.

If the true formation pressure is used in the calculations as outlined in Illustration 7, the calculated reserves and pore space are usually sufficiently accurate. In many cases where the permeability of the formation is low, the bottom hole pressure as measured, or calculated from shut-in casinghead pressure, is less than the correct equilibrium pressure of the formation unless the well is shut-in for some time.

If the pressure used in the calculation, line 6, Illustration 7, is low, the calculated standard cubic feet of gas is one cubic foot of pore space, line 11, is proportionately low. This results in a low value for pore space and a low value for the calculated reserves. It is therefore important to be sure that the reservoir pressure used in such calculations is the true equilibrium pressure that is attained after the gas in the formation is in equilibrium wth the gas in the bottom hole.

The method is obviously not applicable when there is a water drive or the reservoir is not of constant volume.

Measurement of Gas Flow

Flow problems of all kinds are best handled by means of the flow equation which is derived from an energy balance around the flow system.

In the orifice meter, no heat or work is added to, or subtracted from the fluid while flowing through the meter and the energy around the meter considering the fluid in flow is:

$$E_1 + P_1V_1 + \frac{u_1^2}{2g} = E_2 + P_2V_2 + \frac{u_2^2}{2g} \qquad (2)$$

where

E = internal energy of one pound of fluid including all energy possessed by the fluid except that energy due to its condition of flow, such as kinetic energy and energy of position.

PV = pressure times volume (or force times distance); the mechanical energy carried by one pound of fluid due to its condition of flow.

h = potential energy; the energy carried by one pound of fluid due to its position in the gravitational field.

$\frac{u^2}{2g}$ = kinetic energy ($\frac{1}{2}$ mu^2 if m = mass, u = velocity; and mg = weight) carried by one pound of fluid due to its velocity in flow

For continuous flow where A = cross section area of flow passage

$$\frac{A_1u_1}{V_1} = W = \frac{A_2u_2}{V_2} \qquad (3)$$

in which

u = average linear velocity in feet per second
V = specific volume cu. ft. per lb.
W = pounds flowing per second

Substituting $\frac{WV}{A}$ for u, from equation 3, we have

$$E_1 + P_1V_1 + \frac{W^2V_1^2}{A_1^2 2g} = E_2 + P_2V_2 + \frac{W^2V_2^2}{A_2^2 2g}$$

For small pressure drops across the orifice plate it

TABLE 4

Sample Calculation of Gas Reserves Beginning July 1, 1940

		7-1-40	9-10-40	7-1-41	9-1-41	12-30-41
1.	Date					
2.	Gas Specific Gravity	0.68	.....	0.68	.....	0.68
3.	Pseudo Crit. Press. (Fig. 5 or from analysis) p.s.i. abs	668	.....	668	.....	668
4.	Pseudo crit. Temp. (Fig. 6 or from analysis) °abs	380	.....	380	.....	380
5.	Total gas production from reservoir in billions st. cu. ft. at 14.65 p.s.i. 60° F	0	256	560	653	740
6.	Reservoir pressure, P, pounds per sq. in. abs. (measured or calculated from shut-in casinghead pressure as described)	2000	1500	1000	802	660
7.	Reservoir Temperature, T. °F	110	110	110	110	110
8.	Pseudo reduced pressure in reservoir, P_r	2.99	2.25	1.5	1.2	0.99
9.	Pseudo reduced temperature in reservoir, T_r	1.5	1.5	1.5	1.5	1.5
10.	Compressibility, Z, at reservoir conditions	0.778	0.81	0.86	0.088	0.91
11.	Standard cu. ft. of gas in one cu. ft. of pore space in reservoir $\frac{379 \times P}{ZRT} = 0.062\frac{P}{Z}$	159.4	114.5	72.0	56.5	45.0
12.	Standard cu. ft. of gas released from one cu. ft. of pore space since first measurement	.....	44.9	87.4	102.9	114.4
13.	Calculated billions cu. ft. of pore space to produce total gas production since first measurement	.....	5.7	6.4	6.35	6.47
14.	Calculated initial reserve at 2000 p.s.i. reservoir pressure in billions of st. cu. ft. (159.4 x pore space)	.....	910	1020	1010	1030
15.	Current reserve in billions of standard cu. ft.	.....	654	460	357	290

TABLE 5

Observed Data from High Pressure Metering Test Used to Test Accuracy of Compressibility Corrections

Test No.	Meter	In. Diff.	Gauge Press. Lbs.	Integrator 14.4 Extension	Flow. Temp. °F.	Temp. Factor	Observed Sp. Gr.	4 oz. and Sp. Gr. Factor	Line and Disc Sizes	Air Constant	Correct Coeff.	Z=1 Apparent Volume Cu. Ft	Pressure Lbs./sq. in. Abs.	P_r	T_r	Z	$\sqrt{\frac{1}{Z}}$	Correct Volume in Cu. Ft.	Percent Dev. Based on Low Press. Reading
1	L.P.	26"	16½	28.265	113	.9526	.842	1.0712	4x1"	209.6	213.9	6,046	31.2	0.048	1.36	0.992	1.003	6055	
	H.P.	20"	1,300	161.667	92	.9706		1.0712	2x.375"	29.48	30.65	4,955	1315	2.03	1.31	0.688	1.204	5970	—1.4
2	L.P.	30.5"	6	25.236	116	.9501	.870	1.0538	4x1	209.6	209.85	5,296	20.7	0.032	1.367	0.993	1.002	5310	
	H.P.	13"	1,510	141.754	106	.9585			2x.375	29.48	29.78	4,221	1525	2.35	1.341	0.685	1.208	5105	—3.86
3	L.P.	28.5"	6½	24.418	106	.9585	.860	1.0599	4x1	209.6	212.94	5,200	21.2	0.033	1.342	0.993	1.002	5215	
	H.P.	38"	650	161.903	103	.9609			2x.375	29.48	30.02	4,860	665	1.026	1.335	0.838	1.092	5310	+1.82
4	L.P.	26.5"	12	26.556	79	.9822	.867	1.0556	4x1	209.6	217.32	5,771	26.7	0.041	1.253	0.992	1.033	5790	
	H.P.	16"	1,340	148.588	78	.9831			2x.375	29.48	30.59	4,545	1355	2.08	1.251	0.608	1.282	5820	+0.52
5	L.P.	20.5"	13½	23.898	124	.9436	.839	1.0731	4x1	209.6	212.24	5,072	28.2	0.044	1.42	0.992	1.003	5090	
	H.P.	28"	840	157.543	117	.9493			2x.375	29.48	30.03	4,731	855	1.322	1.406	0.839	1.091	5150	+1.18
6	L.P.	24.5"	17½	28.265	69	.9915	.834	1.0763	4x1	209.6	223.67	6,322	32.2	0.050	1.287	0.992	1.003	6350	
	H.P.	24"	1,230	172.390	84	.9777			2x.375	29.48	31.02	5,348	1245	1.927	1.321	0.710	1.188	6350	0
																		Average .	0.29%

may be assumed that $V_1 = V_2$ and $E_1 = E_2$. For these conditions the above equation reduces to

$$W^2 V^2 \left[\frac{1}{A_1^2} - \frac{1}{A_2^2}\right] = 2gV(P_2 - P_1)$$

$$W = \frac{A_2}{\sqrt{1 - \left(\frac{A_2}{A_1}\right)^2}} \sqrt{\frac{2g(P_1 - P_2)}{V}}$$

In actual use the cross-sectional area of the orifice, A_c, is used instead of the contracted area of the fluid, A_2, at the "vena contracta" as indicated in Figure 7 and a factor K′ is used to correct the equation for friction losses for this substitution of areas.

$$W = \frac{K' A_c \sqrt{2g}}{\sqrt{1 - \left(\frac{A_c}{A_1}\right)^2}} \sqrt{\frac{P_1 - P_2}{V}} \qquad (5)$$

The value of $\sqrt{1 - \left(\frac{A_c}{A_1}\right)^2}$ is very close to unity, being .96825 when $\left(\frac{A_c}{A_1}\right)$ is 0.25 or the diameter ratio of $\frac{D_c}{D_1} = \frac{\text{orifice diameter}}{\text{pipe diameter}}$ is as large as 0.5. Therefore, this factor may be, and usually is, omitted with the effect of making the meter reading somewhat low. It is, of course, possible to make some compensating adjustment in the value of K′ when the diameter ratio is large. This is done in commercial practice when this ratio is larger than 0.4 so that the meter reading is not more than 2 or 3 percent in error because of this practice.

The effect of the velocity and viscosity of the gas on the friction loss in the orifice is relatively small and usually neglected. This leaves the value of K simply a function of the diameter ratio $\left(\frac{D_c}{D_1}\right)$, the mechanical setting of the meter, and the position of the pressure connections.

In determining the flow of gas it is customary to express the result in standard cubic feet (as measured at 60° F. and 14.65 lbs. per sq. in. abs.) per day, or per hour, rather than in lbs. per second, and the drop in pressure $(P_1 - P_2)$ is frequently expressed in inches of water, or inches of mercury, instead of in pounds per square foot.

From equation 1 the specific volume at any condition of T, and P, is

$$V = \frac{ZRT}{MP}$$

Making these substitutions in equation 5

$$\text{St. cu. ft./hr. (at } T_s P_s) = K \frac{Z_s R T_s}{M P_s} \times 3600\, A_c \sqrt{2g} \sqrt{\frac{(h_1 - h_2)_w 62.4}{\frac{Z_2 R T_2}{M P_2}}} \quad 12 \qquad (6)$$

where, $(h_1 - h_2)_w$ = differential pressure in inches of water
M = molecular weight of the gas
If Z_s is assumed to be unity as for an ideal gas

$$\text{St. cu. ft./hr. (at } T_s P_s) = K \frac{T_s}{P_s} \times 3600\, A_c \sqrt{2g} \sqrt{\frac{62.4}{12}} \sqrt{R} \sqrt{\frac{(h_1 - h_2)_w P_2}{M Z_2 T_2}}$$

$$= 2{,}588{,}659\, K\, A_c \frac{T_s}{P_s} \sqrt{\frac{(h_1 - h_2)_w P_2}{M Z_2 T_2}} \qquad (6a)$$

Frequently the "coefficient" also includes the values for M and T_2 so that the gas flow is determined by the equation

$$\text{St. cu. ft. per hr.} = C \sqrt{\frac{(h_1 - h_2)_w P_2}{Z_2}} \qquad (7)$$

If the meter coefficient is so expressed (equation 7) the value for Z_2 is also frequently assumed to be

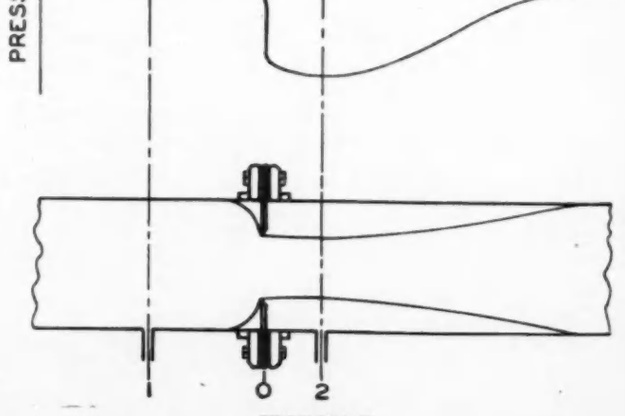

FIGURE 7

Diagrammatic Sketch of an Orifice Meter.

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TABLE 6

Analyses and Pseudo Critical Properties of Gas Samples Taken During Tests of Table 5

Comp.	Sample No. 1 (Test 1)						Sample No. 2 (Test 2)				Sample No. 3 (Test 3)				Sample No. 4 (Test 4)				Sample No. 5 (Test 5)			
	Mole Fraction	Mole Fract. × Mole Wt.	P_c	T_c	Mole Fract. × P_c	Mole Fract. × T_c	Mole Fraction	Mole Fract. × Mole Wt.	Mole Fract. × P_c	Mole Fract. × T_c	Mole Fraction	Mole Fract. × Mole Wt.	Mole Fract. × P_c	Mole Fract. × T_c	Mole Fraction	Mole Fract. × Mole Wt.	Mole Fract. × P_c	Mole Fract. × T_c	Mole Fraction	Mole Fract. × Mole Wt.	Mole Fract. × P_c	Mole Fract. × T_c
O_2	0.0014	0.04	730	277	1.02	0.39	0.0013	0.04	0.95	0.36	0.0011	0.03	0.80	0.31	0.0024	0.08	1.75	0.67	0.0011	0.03	0.80	0.31
N_2	0.1038	2.91	492	227	51.10	23.60	0.0988	2.77	48.60	22.45	0.0975	2.73	47.90	22.15	0.0877	2.46	43.10	19.93	0.1175	3.29	58.40	26.70
C_1	0.5685	9.10	673	344	383.00	195.80	0.5749	9.20	387.00	198.00	0.5776	9.24	388.50	197.80	0.5639	9.01	380.00	194.00	0.5919	9.46	398.00	203.50
C_2	0.1469	4.40	712	549	104.70	80.50	0.1488	4.46	106.20	81.70	0.1445	4.34	103.00	79.30	0.1585	4.75	113.00	87.00	0.1346	4.04	95.90	73.90
C_3	0.1502	6.61	617	665	92.60	99.80	0.1436	6.31	88.60	95.50	0.1455	6.40	89.80	96.60	0.1521	6.71	93.90	101.20	0.1156	5.09	71.40	76.90
i-C_4	0.0103	0.60	544	732	5.60	7.54	0.0110	0.64	5.97	8.06	0.0116	0.67	6.30	8.48	0.0097	0.56	5.27	7.10	0.0105	0.61	5.71	7.69
C_4	0.0185	1.07	551	766	10.20	14.20	0.0204	1.18	11.24	15.67	0.0212	1.23	11.70	16.28	0.0247	1.43	13.62	18.98	0.0231	1.34	12.73	17.70
C_5	0.0004	0.03	485	846	0.19	0.34	0.0012	0.09	0.58	1.02	0.0010	0.07	0.49	0.85	0.0010	0.07	0.49	0.85	0.0049	0.35	2.38	4.15
C_6	.....	....	435	914	.....	.....	.....	....	.....	.....	.....	....	.....	.....	.....	....	.....	.....	0.0008	0.07	0.35	0.73
	.....	24.76	....	....	648.41	422.17	.....	24.69	649.14	422.76	.....	24.71	648.49	421.77	.....	25.07	651.13	429.73	.....	24.28	646.67	411.58

equal to unity, as for ideal gases. In order to obtain the correct reading in such cases it is necessary to multiply the meter reading calculated by the ideal gas laws, by $\sqrt{\frac{1}{Z_s}}$.

To obtain a correct value for Z_s an accurate reading for the temperature of the gas being measured is at least as important as an accurate reading for the pressure. Because a difference of 15° F. between the gas temperature and the standard temperature introduces less than 3% error in the meter reading when assuming the ideal gas laws, the importance of an accurate temperature reading is frequently overlooked even in measurements at high pressure. This practice is unfortunate, as the temperature is most important in determining values for Z, particularly at high pressure.

The independent correction for the temperature of the gas being measured should also be made. This can be done by multiplying by

$$\sqrt{\frac{T_s}{T}} = \sqrt{\frac{460 + t_s\,°F.}{460 + t\,°F.}}$$

Similarly if the "coefficient" also includes the molecular weight, or the specific gravity of the gas being measured, a correction must be made by multiplying the values obtained from equation 12, or its equivalent, by

$$\sqrt{\frac{M_s}{M}} = \sqrt{\frac{(Sp.gr.)_s}{(Sp.gr.)}}$$

where

M_s = molecular wt. used in determining C in equation 7
M = actual molecular weight of gas being measured
$(Sp.gr.)_s$ = sp.gr. used in determining C in equation 7
$(Sp.gr.)$ = sp.gr. of gas being measured

Accuracy. When used with the corrections indicated provided $\frac{P_2}{P_1}$ is not less than 0.8, and the diameter of the orifice is not more than ⅓ that of the pipe equations 6 and 7 are accurate to within about ±1% which is better than the accuracy of meter reading and calibration.

Comparison with Field Tests

Through the courtesy of the Natural Gasoline Department of Phillips Petroleum Company, W. F. Matheny, chief manufacturing engineer, under date of April 15, 1940, to William F. Lowe, we have the careful test data reported in Table 5 and the analysis of samples taken during the tests as indicated in Table 6.

The data include an actual specific gravity determination and analysis corresponding to each test. The results show an average deviation of less than —0.3%, and the maximum deviation 3.86% is little more than the accepted error in orifice meter tests.

It therefore appears that the methods outlined are satisfactory for correcting for ideal gas deviations provided a reliable specific gravity reading or analysis is made of the gas being measured and the temperature and usual meter readings are carefully taken. The greatest errors in otherwise careful gas measurements at high pressure are caused by inaccurate data on gas gravity or composition and temperature.

Construction of Enthalpy-Entropy Diagram

Based on Figure 4 it is possible to determine the effect of isothermal changes in pressure on the enthalpy H, and entropy S, of a natural gas in terms of its pseudo-reduced temperature and pressure, by means of graphical calculus and well known thermodynamic relationships which need not be included in this already too long discussion. These relationships are given in Figures 8 and 9.

Figure 8 gives the isothermal increase in enthalpy, H, with an increase in reduced pressure for constant reduced temperature. The reference pressure for Fig-

TABLE 7

Construction of H-S Diagram for Natural Gas A Using Figures 8, 9, 10

°F.	° Abs.	T_r	P_r — 0.02 Atmos. Press.			1000 Lbs./Sq. In. Abs. P_r — 1.5						2000 Lbs./Sq. In. Abs. P_r — 3.0					
			° H	S	$-\frac{\Delta H}{T}$	$-\frac{\Delta H}{T}$	$-\Delta\frac{AH}{T}$	$-\Delta H$	$-\Delta S$	H	S	$-\frac{\Delta H}{T}$	$-\Delta\frac{AH}{T}$	$-\Delta H$	$-\Delta S$	H	S
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
32	492	1.252	0	0	0.02	2.21	2.08	1024	9.93	—1024	—9.93	3.975	3.955	1948	12.66	—1948	—12.66
100	560	1.423	673	1.28	0.016	1.21	1.194	669	9.25	— 4	—7.97	2.48	2.464	1381	11.57	— 708	—10.29
200	660	1.679	1730	3.02	0.012	0.72	0.708	467	8.91	+1263	—5.89	1.40	1.388	916	10.83	+ 814	— 7.81
300	760	1.932	2890	4.63	0.005	0.49	0.485	368	8.79	+2522	—4.16	0.91	0.905	687	10.48	+2203	— 5.85
400	860	2.185	4130	6.2	0.001	0.33	0.329	283	8.67	+3847	—2.47	0.62	0.619	532	10.32	+3598	— 4.12

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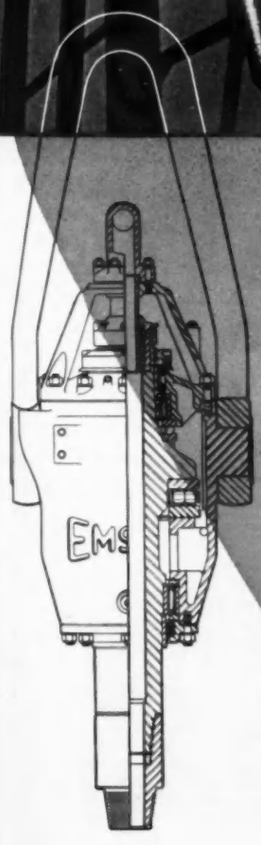

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ure 8 is absolute zero pressure. The isothermal increase in enthalpy with pressure is negative as indicated. Therefore to find the enthalpy of a gas at any specified temperature and pressure the following steps are necessary.

1. Select a reference point at which the enthalpy is considered to be zero, such as 32° F. and 14.65 pounds per square inch absolute.
2. Determine the enthalpy at the desired temperature and 14.65 pounds per square inch absolute from heat capacity data or Figure 10 which gives this value of enthalpy directly as a function of temperature and molecular weight.
3. Determine the decrease in enthalpy between 14.65 pounds per square inch and the desired pressure, P, by use of Figure 8 using the pseudo-reduced temperature determined in the manner described and the pseudo-reduced pressures for 14.65 pounds per square inch and the desired pressure, P. Remember that the enthalpy at the higher pressure is less than at the lower pressure, and be sure to multiply the value read on the ordinate of Figure 8 by the absolute temperature to get the value for $H_p - H_{14.65}$.

Figure 9 gives the isothermal increase in entropy as a function of reduced temperature and increase in reduced pressure above atmospheric pressure. Since the entropy at zero pressure becomes infinite it is necessary to use a finite pressure (one atmosphere) as a reference point for Figure 9. To find the entropy of a gas at any specified temperature and pressure follow a similar procedure as was outlined for computing the enthalpy.

Illustration 9. Construction of an Enthalpy-Entropy Plot for Natural Gas "A" as Used in Tables 2 and 3.

From Table 2 the molecular weight of the gas is 20.36. Using the curves of Figure 10, we may read the entropy S, and enthalpy H, for this gas at atmospheric pressure and at different temperatures as set forth below in Table 7.

Having determined the values for H and S from Figure 10 at atmospheric pressure as listed in columns 4 and 5 of Table 7, it is then a simple matter to plot the atmospheric (14.7 pounds per square inch) pressure line on the H-S diagram, Figure 11. The intersection of the atmospheric pressure line with the constant temperature lines of 32°, 100°, 200°, 300°, and 400° F. are also located by this first calculation, and as indicated on the line of atmospheric pressure on the enthalpy-entropy plot, Figure 11.

In order to locate the enthalpy-entropy line for other pressures than one atmosphere, it is necessary to refer to Figures 8 and 9 and to use the pseudo critical temperature and pressure of natural gas "A"

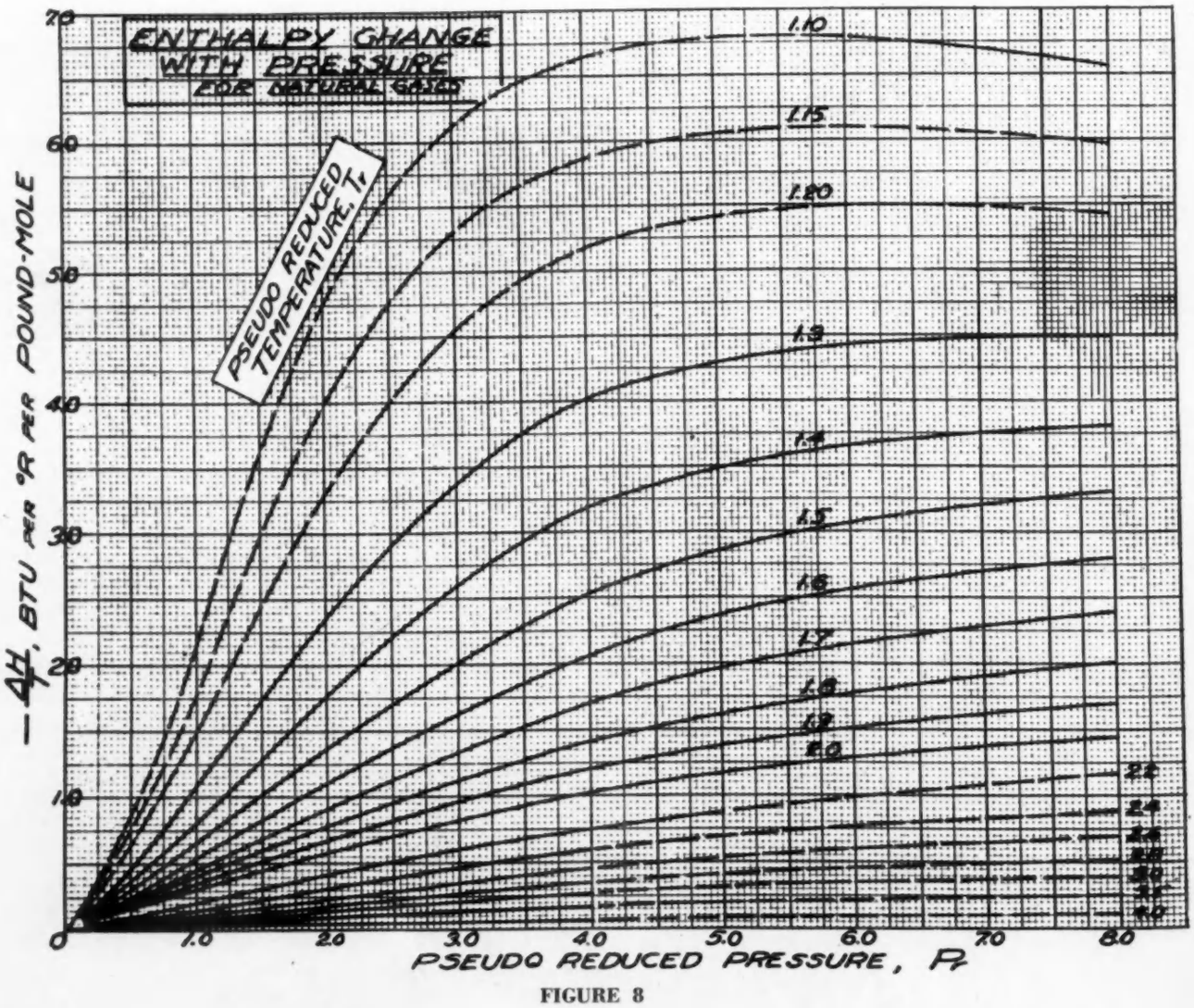

FIGURE 8

as computed in Table 3. The pseudo-reduced temperature is given in column 3 and the pseudo-reduced pressure indicated at the top of the table for atmospheric (14.7), 1000 pounds per square inch absolute and 2000 pounds per square inch absolute.

The values read from Figure 8 corresponding to atmospheric pressure are then listed in column 6 for the corresponding reduced temperatures as given in column 3.

The values read from Figure 8 for a reduced pressure of 1.5 corresponding to about 1000 pounds per square inch are then listed in column 7. The differences obtained by subtracting the values in column 6 from column 7 are listed in column 8, which gives the values for the increase in pressure from atmospheric to 1000 pounds per square inch absolute at the temperature indicated in column 1. By multiplying the values in column 8 by the absolute temperature as given in column 2, we obtain the values given in column 9 which gives the decrease in enthalpy as the pressure is increased from atmospheric to 1000 pounds per square inch at the constant temperature indicated in column 1.

Subtracting the values in column 9 from those in column 4 gives the values in column 11, which is the enthalpy at 1000 pounds per square inch absolute pressure and the temperature given in column 1.

The decrease in entropy accompanying an increase in pressure is determined from Figure 9 by reading the values as a function of the reduced temperature as given in column 3 for the reduced pressure of 1.5 which corresponds to about 1000 pounds per square inch. Subtracting the values in column 10 from those in column 5 gives the values listed in column 12, which gives the entropy at 1000 pounds

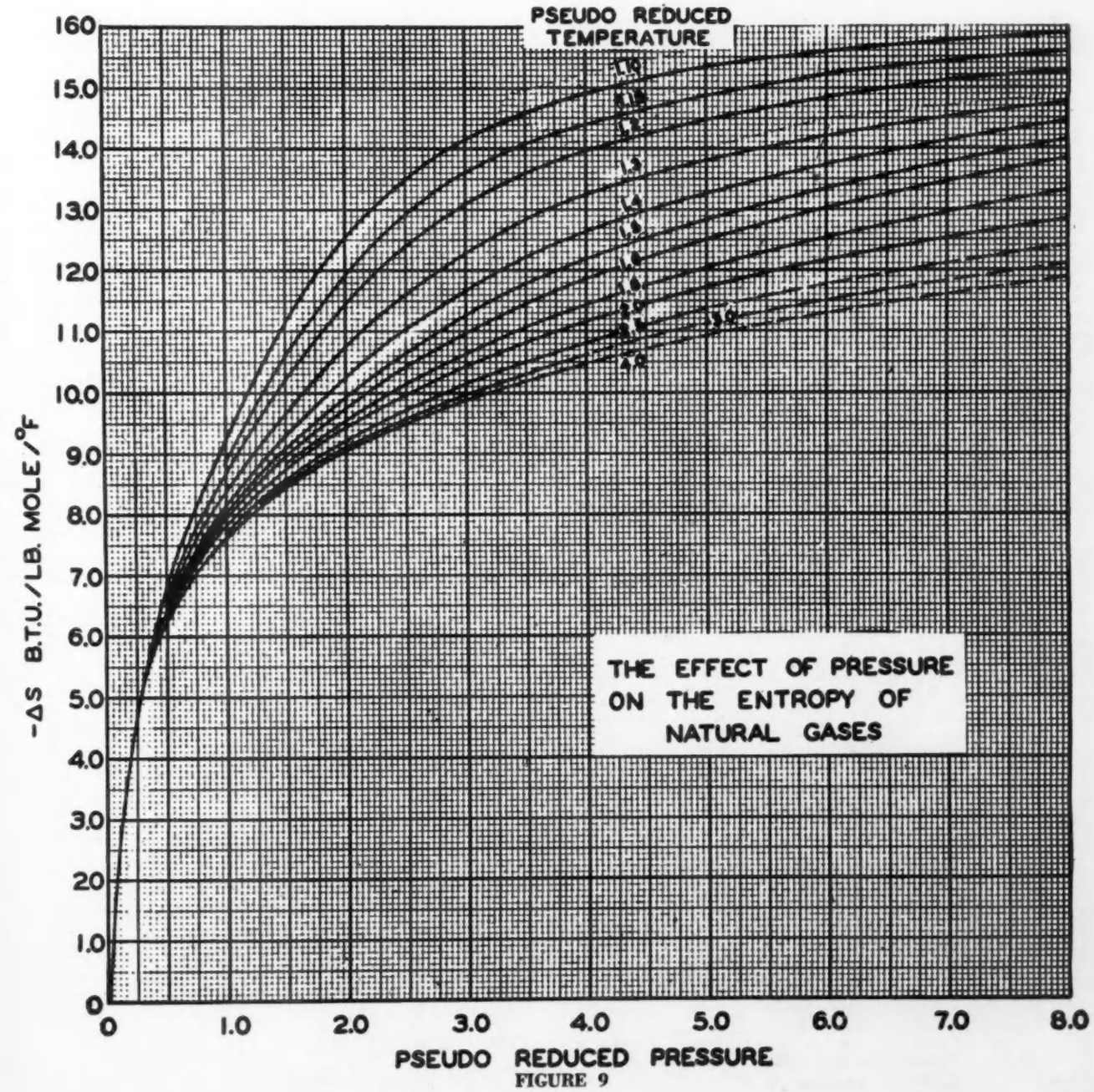

FIGURE 9

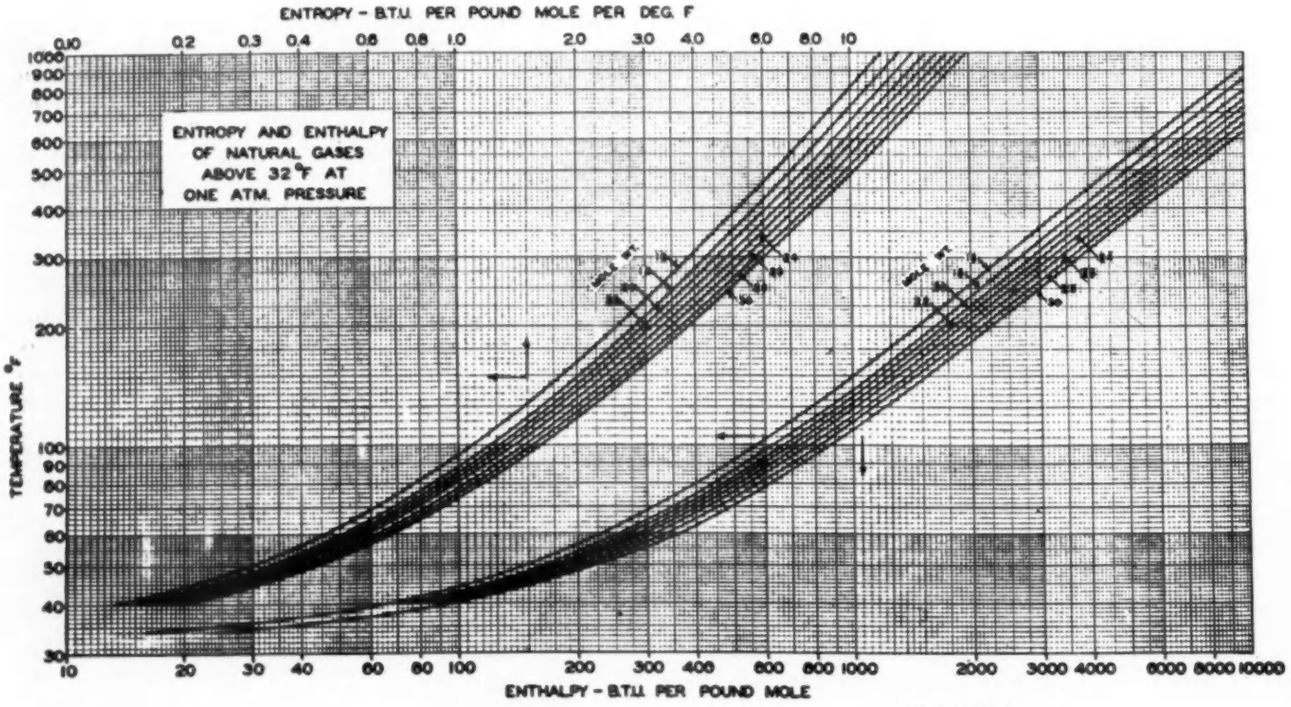
ENTROPY - B.T.U. PER POUND MOLE PER DEG. F
ENTROPY AND ENTHALPY OF NATURAL GASES ABOVE 32°F AT ONE ATM. PRESSURE
TEMPERATURE °F
ENTHALPY - B.T.U. PER POUND MOLE

FIGURE 10

per square inch pressure at the temperature indicated in column 1.

If the values in columns 11 and 12 are plotted in Figure 11, we have the enthalpy-entropy curve for the constant pressure of 1000 pounds per square inch absolute. By locating the points for the temperatures as listed in column 1, lines may be drawn connecting the same temperatures on the atmospheric pressure curve and the 1000 pounds per square inch pressure curve giving lines of constant temperature.

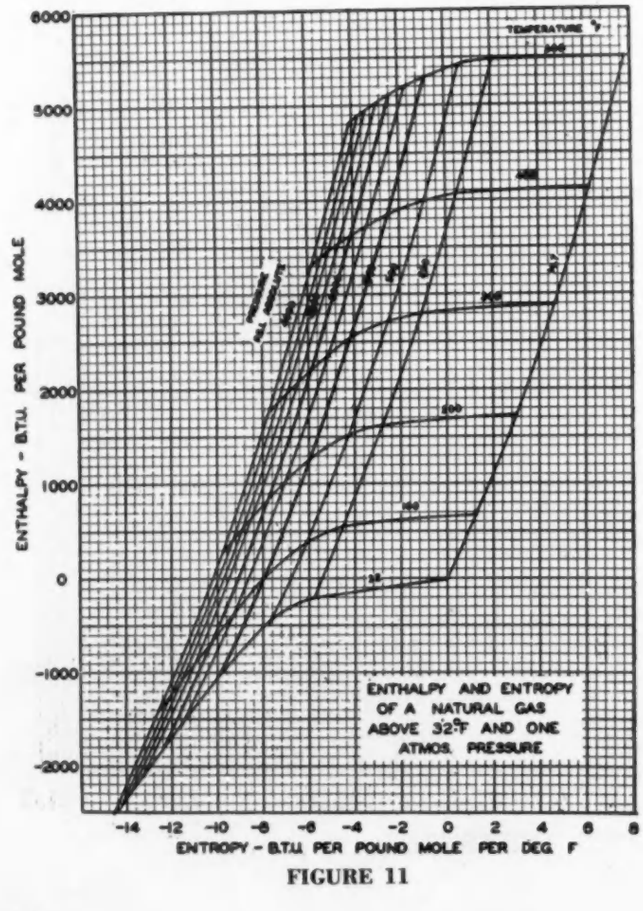
ENTHALPY AND ENTROPY OF A NATURAL GAS ABOVE 32°F AND ONE ATMOS. PRESSURE
ENTHALPY - B.T.U. PER POUND MOLE
ENTROPY - B.T.U. PER POUND MOLE PER DEG. F

FIGURE 11

Exactly the same procedure is followed in determining the values at 2000 pounds per square inch as listed in columns 13 through 18. When these values are plotted, the 2000-pound pressure curve is located on Figure 11 and by connecting the points of constant temperature, the isothermal lines are drawn in.

Volume lines may be determined by use of Figure 4 in connection with the known temperatures and pressures in Figure 11.

By proceeding in this manner a reasonably accurate enthalpy-entropy diagram may be constructed for any natural gas. Such a diagram has all the utility when applied to natural gas that the familiar Mollier diagram has for steam. It enables more reliable calculations to be made for the design of compressor plants and also for all flow problems.

This is not the place for a discussion of the use of an enthalpy-entropy diagram, but it will be recalled that free expansion through a throttling valve takes place at constant enthalpy, and it has been found that the compression of a gas in a large gas compressor follows rather closely the adiabatic path of constant entropy.

It will be recalled that enthalpy, H, equals E + PV, so that the energy may be readily computed by subtracting the product (PV) after dividing by 778 to convert foot pounds to B.t.u.'s, from the enthalpy as given in Figure 11.

In many cases the desired computation may be made without actually constructing the enthalpy-entropy chart such as Figure 11 by use of the data in Figures 4, 8, 9, and 10 by methods that will suggest themselves to those who have occasion to make many such calculations.

The foregoing article was presented at the American Recycling Association meeting in Kingsville, Texas, on November 5 and 6.

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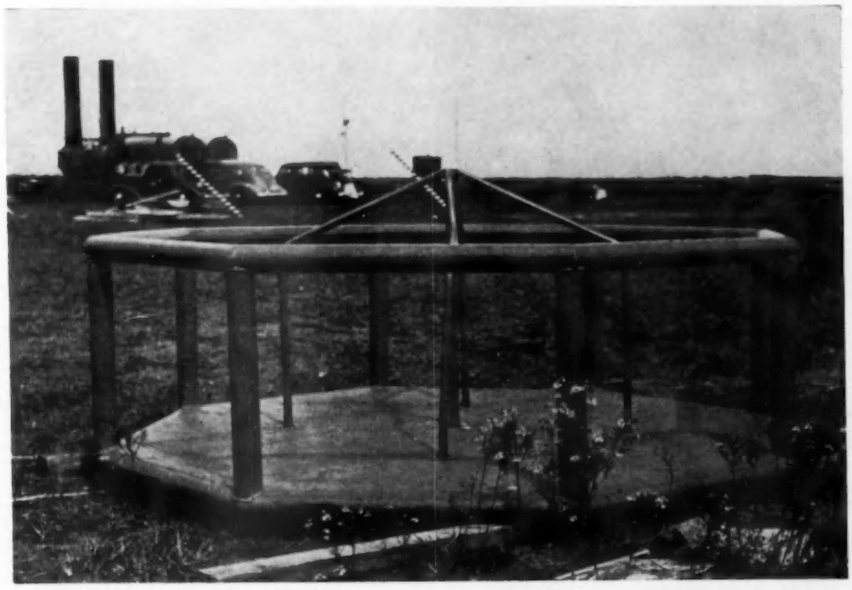
Steel Frame Permits Safe Transportation of Rotary Hose Without Crimping



Rotary hose is protected from accidental injury during transit by this welded frame with a steel bottom plate. It also affords a jig for coiling without crimping.

PROTECTION of the two rotary hoses during shift of locations is assured by coiling them down within a steel drum or rack, shod with light tank steel and with sides and top rim formed from heavy pipe. To prevent stacking of other equipment within the rack, and also to afford a hitch for the truck winch line, a central spider is formed from sucker rod material, terminating in an elevated cross into which the hook may be engaged without fouling the hose.

By making the rack frame octagonal, posts are placed closely enough together to prevent the hose from being pinched or damaged by other equipment loaded beside it. Whenever possible, the hose rack is loaded last on a truck, topping the other and heavier equipment for additional safeguard against damage.

2. TOOL CARE

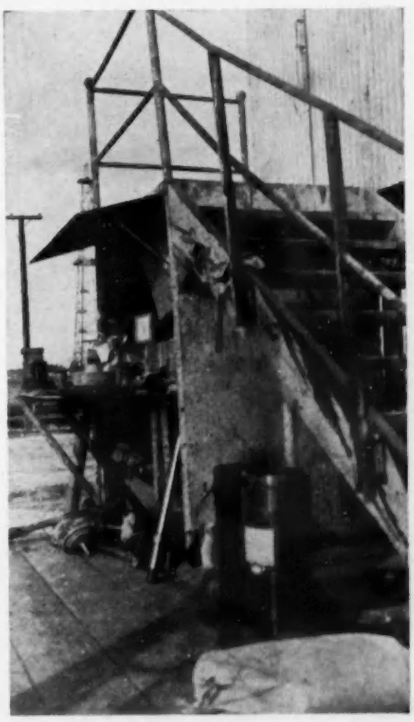
Work Bench at Rig Is Portable

A SERVICEABLE work bench may be made for use on drilling wells by welding 2-inch pipe in the form of a right triangle, two of which are required, one for each side. The vertical side, which forms the back of the frame, extends two inches above the weld so that it may be slipped in a collar welded to the frame of the tool cabinet. The lower end of the vertical section is shaped as a hook, so that it may be slipped over a cross member of the cabinet to make the base, inverted, lie horizontal. The two frame sections may be spaced as wide apart as desired, and on them a sheet of tank steel is welded to form the working surface.

3. RIGGING UP

Support for Stack End of Boiler

WHEN erecting a battery of drilling boilers, stack ends may be supported on single sections of 12-inch pipe, contoured at the top to fit the shell of the boiler. The lower



This bench employs features of portability, yet provides adequate working area.

Single joint of pipe, with welded flange on base, supports smoke box end of boiler.

end of the pipe support is attached to a heavy plate of iron with web stiffeners at each corner. A long concrete pier is poured beneath the battery to receive these supporting standards and so that the boilers will remain level and in alignment throughout the drilling operation. Small rectangular piers, poured at a point between each boiler, are faced with channel iron sections to support the weight of the steam header to prevent distortion and misalignment due to expansion and contraction.

This flume with baffles is used to degassify drilling mud before reuse.

4. MUD HANDLING

Flume With Baffles to Degassify Mud

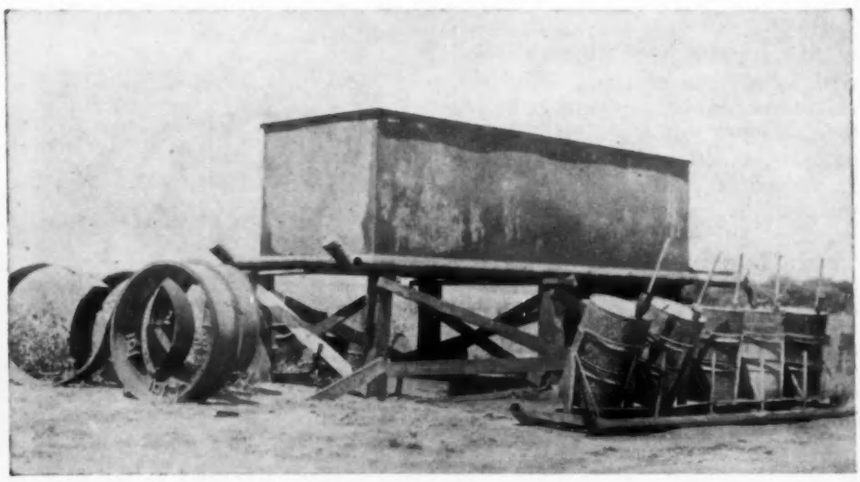
AN INCLINED flume with staggered baffles may be used for degassifying cut mud when this trouble arises. Cleats of 1x4-inch, are nailed on the floor of the flume, criss-crossing back and forth from wall to wall, with a center strip of 1 x 4-inch nailed over these cleats. Baffles following the outline of the cleats are inserted in the flume with the cleats vertical, and the finished flume set with one end elevated to give a slope of about 45 degrees. The walls are high enough to prevent slopping over when the mud is pumped in at the high end, and flows downward over the baffles. Sufficient turbulence is obtained by the slope of the flume and the arrangement of the baffles and cleats to break the mud into a violently agitated mass so that entrained gas can be removed.

5. OIL HANDLING

Tank and Drums Used Advantageously

DIESEL fuel is being handled efficiently in a large rectangular vat by Ray Stephens, Inc., in the Cement field of Caddo County, Oklahoma. A pipe skid base is supported by a wooden substructure. This welded tank is 7x20 feet and is easily winched to a truck for transportation.

Either lubricating oils or Diesel fuel may be stored in the barrels supported by the portable rack placed in front of the tank. The rack holds five containers, each tilting independently of the other by means of a steel swing.

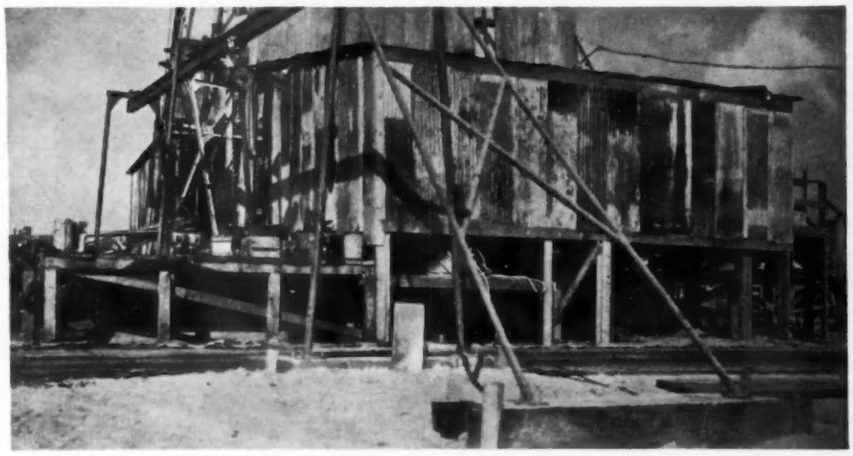


Diesel and lubricating oils are handled efficiently in tank and drums shown above.

DRILLING CONTRACTORS' NOTEBOOK

6. MATERIALS HANDLING

Hoist on Overhead Track Aids in Moving Heavy Objects to Derrick Floor



A chain hoist on a trolley facilitates moving heavy articles from truck to bit rack.

WHEN handling heavy bits, subs and other drilling tools, a convenient and easily moved chain hoist track and support may be installed by making three A-frames with adequate connections at the top for supporting a channel-iron trolley track. Two of these frames are shortened to stand on the tool rack floor beside the derrick, and the other long enough to maintain the track in a level position and set on a concrete pier on the opposite side of roadway. Side sway is prevented by the width of the frames at their bases, and end movement is prevented by a fourth A-frame, bolted at the top of the outside frame, and anchored at an angle from the vertical to a second concrete pier.

Water hose coiled on this stand is kept out of mud and protected from damage.

7. HOSE CARE

Portable Stand for Water Hose

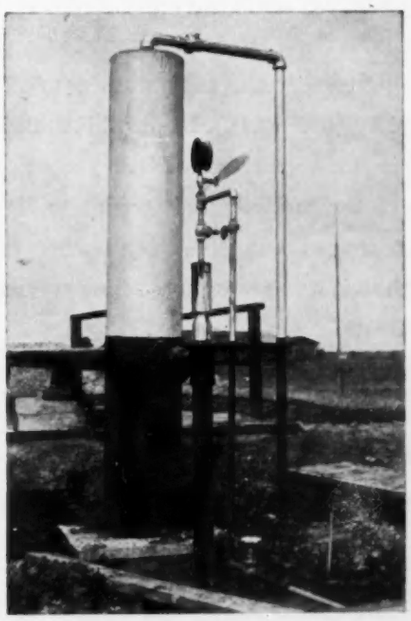
WATER hose, which frequently is left on the ground, may be protected from damage by using a portable stand with a flat steel table-top, free to rotate on a standard of 2-inch pipe driven in the ground at any convenient spot. The table is made by using a circular sheet of light-weight steel, welded to a supporting frame of sucker-rod material radiating from a center hub. The hub is attached to a short nipple of pipe, large enough to slip over the upright standard for freedom of rotation. The outer ends of the spokes are bounded by a ring of sucker-rod material so the table-top will be substantial enough to support the water hose coiled on its surface.

8. WATER SUPPLY

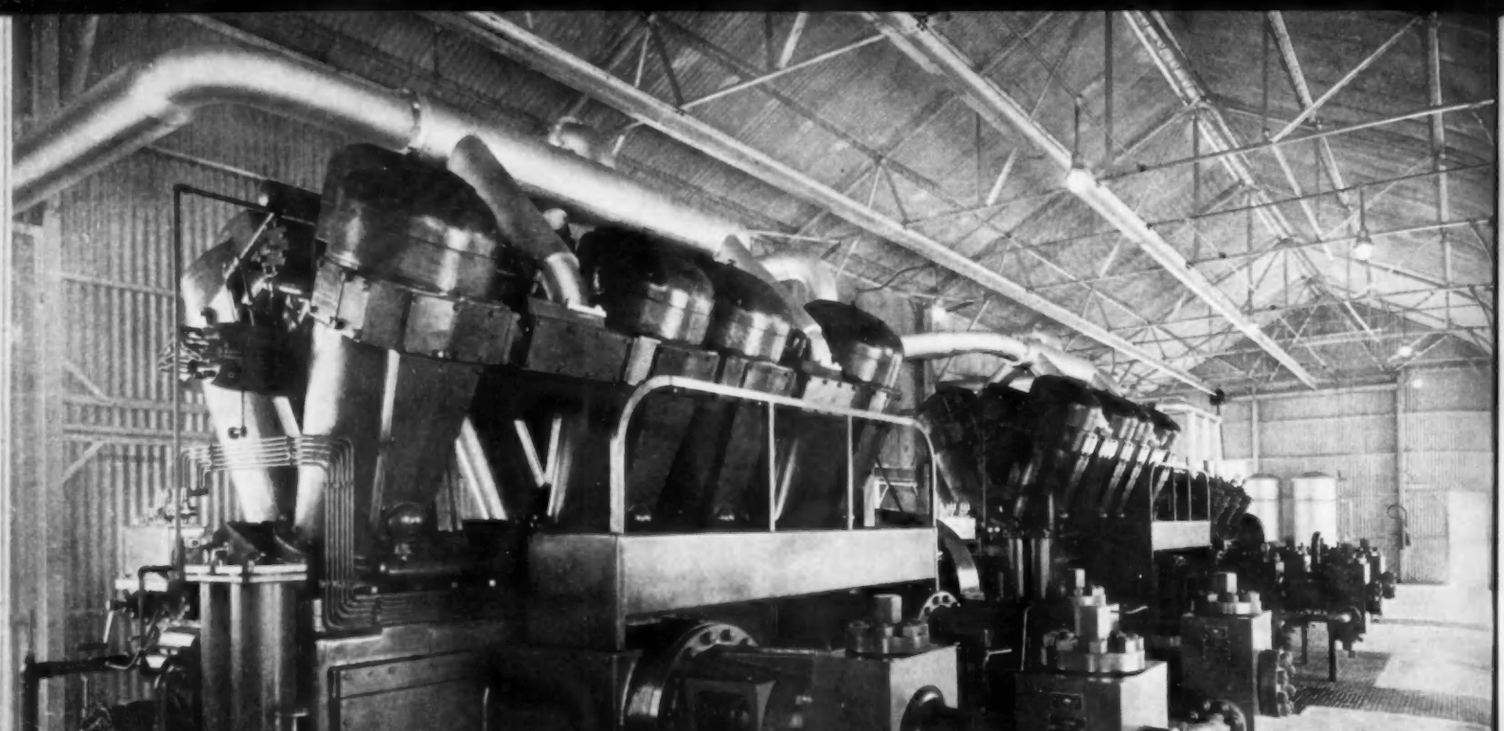
Separator on Well Is Safety Feature

USE of high-pressure gas for flowing water wells at the drilling site results in the formation of considerable quantities of potential explosive mixtures unless measures are adopted to control the dissipation of the spent gas.

One company erects a separator at the well-head, with a head of at least four feet to enable the gas and water to separate and the gas to be led off through a vent line at the top. By use of this equipment, the amount of gas carried over in the water is reduced to the relatively few bubbles which have not separated out in the baffles, and the dilution attained is such that explosion hazards are eliminated.



This separator set on water well head automatically removes gas from fluid.



LVG 4-CYCLE

COMPRESSORS

IN CORONADO'S NEW RECYCLING PLANT

In the La Rosa Field the Coronado Corporation is operating its new recycling and natural gasoline plant (45,000,000 to 50,000,000 cu. ft.). Ingersoll-Rand 650 HP, Type LVG gas engine-compressors deliver the stripped high-pressure gas to the sand at pressures up to 2600 lbs. Suction to these compressors from the absorbers is 1650 to 1700 lbs. Each unit has two double-acting forged steel compressor cylinders.

An Ingersoll-Rand 225 HP, Type XVG has one recompressing cylinder and also drives the main reciprocating pump for circulating clean absorption oil to the scrubbers.

Among the many outstanding advantages of the LVG compressor is its inherent reliability and simplicity of 4-cycle engine design. The LVG gives continuous heavy duty service because it is substantially built and conservatively rated.

Correct compressor cylinders — too often taken for granted on engine-driven units—share importance equally with the driver. No units comparable with the LVG are available today with as many cylinder sizes built for as many varied services.

Ingersoll-Rand oil-field representatives are ready to help you with your compressor, pump or engine problems. Call upon them at any time.

Other I-R Products for the Oil Industry include: Centrifugal Pumps, Gas and Oil Engines, Air and Gas Compressors, Condensers, Air Tools, Etc.

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HIGHLIGHTS IN THE WEEK'S NEWS

Compact

Compact Suggests Uniform State Conservation Statute

A uniform conservation law to be suggested to all oil-producing states was adopted at a meeting of the Interstate Oil Compact Commission in Oklahoma City, December 30. The bill is a comprehensive measure covering all phases of conservation and control of the production of oil and gas, and many new features have been added to solve problems that have arisen in the past.

See Text of Proposed State Conservation Law, Page 45. And Legislative Review, Page 8.

At the same time, the commission passed two important resolutions. One invites all oil-producing states that are members of the compact to contribute to its support. Oklahoma has paid all expenses thus far, and expanding work and reduced income from the tax assessed in Oklahoma has resulted in the need for income from other sources.

The second resolution provides for additional representatives to be assigned by the federal government and the states to assist the compact. They are to serve as "advisors and counselors." Included in this group would be representatives from the Department of Interior, the regulatory bodies of all the oil-producing states, the governors of states which are not now members of the compact, and the national trade associations whose members are engaged in producing oil and gas. The representatives are entitled to attend all sessions of the compact, whether open or executive, and to supply to the compact and its committees information relating to conservation problems and to make any suggestions they choose concerning the program the compact shall follow. They are to be officially appointed, and must supply credentials in writing.

Representatives from Illinois, Texas, New Mexico, Colorado, Kansas and Oklahoma attended the session. Most of the meeting was devoted to discussion of the proposed conservation bill. All meetings were executive, closed to the press, and open to all oil men.

The proposed conservation bill was drawn up by a committee headed by Earl Foster, attorney for the Oklahoma Corporation Commission, who was assisted by James C. Hamill. On the committee were Harold J. Medill, of Kansas, who was assisted by Jack Jones; R. E. Hardwicke, of Texas, who was assisted by Maurice Cheek; P. J. Hoffmaster, of Michigan; Carl B. Livingston, of New Mexico, who was assisted by Hiram Dow; and Warwick Downing, of Colorado.

From its beginning in Section 1, with a definition of waste, to the saving clause, contains clause after clause dealing with controversial issues relating to the production of oil and gas.

Waste is defined as "the inefficient, excessive, or improper use or dissipation of reservoir energy; and the locating, spacing, drilling, equipping, operating, or producing of any oil or gas well or wells in a manner which results, or tends to result, in reducing the quantity of oil or gas ultimately recoverable from any pool . . . ; . . . the inefficient storing of oil; the producing of oil or gas in excess of transportation or marketing facilities or of reasonable market demand; . . . and the use of gas from a well producing gas only for the manufacture of carbon black or chemicals unless authorized under this Act . . ."

In defining crude oil and other products, the bill provides for proration of condensate, but carefully excludes casinghead gasoline. Thus the attorneys hoped to bring about control of the distillate or condensate production which is now without restriction in Texas.

Care has been taken to define the control of oil fields as distinguished between oil pools. The word "pool" is used to define separate reservoirs which may or may not lie within the same "field."

Illegal oil, gas and products are carefully defined as those which are produced in excess of state limitations.

In defining proration units, the commission is given the right to determine whether all of a unit is productive, and in the event it finds that part is non-

[*Continued on page 52*]

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Washington

Arnold Calls for Greater Vigilance Against Monopoly

Increased vigilance lest the national defense program be used for fostering monopoly was called for January 3 by Assistant Attorney General Thurman Arnold, in charge of the anti-trust division of the Department of Justice.

"Preparation for national defense inevitably opens the door for even greater concentration of industrial wealth and power," Arnold declared in his annual report to the attorney general. "It is well known that large-scale expenditures for military purposes are always accompanied by the danger of booming prices and by other dangers born of relaxed business standards and relaxed public vigilance. In these times, when all ramparts need to be watched, it is particularly urgent that a domestic rampart such as anti-trust enforcement be kept at full strength. The existing emergency is as much an emergency for our economic structure as for our external security."

Arnold made no specific reference to the broad suit filed last year against the oil industry in the District of Columbia Federal Court, but confined his report almost entirely to an exposition of the many responsibilities of his division, which enforces 31 acts in addition to those dealing with monopoly. He did explain, however, that about three years are required for handling an anti-trust case, the first year to investigation, the second to securing an appropriation and preparing the case, and the third for its trial.

"The second year is usually the most difficult because in anti-trust enforcement it is often necessary to prove an unlawful course of conduct by evidence of a series of hidden practices which, when pieced together, constitute a pattern of prohibited conduct," he commented. "Most of the evidence upon which an anti-trust case is built frequently must be sought in the files of the offending parties. And after 50 years of experience, the seasoned violators are no longer careless about the contents of their files."

Tax Division Report

Two decisions of utmost importance in connection with depletion of oil and gas wells were rendered by the Supreme Court during the last fiscal year, it was emphasized by Assistant Attorney General Samuel O. Clark, Jr., in reporting upon activities of the tax division.

The decisions were rendered in the cases of the Wilshire Oil Company and the F.H.E. Oil Company.

"Under the revenue act of 1926 and subsequent acts," the report explained, "Congress permitted the deduction of depletion based upon a percentage of the gross and net income from the property. The allowance was 27½ percent of the gross income from the property during the taxable year, but the acts provide that the allowance shall

not exceed 50 percent of the net income of the taxpayer from the property.

"Development expenses which the taxpayer had elected to deduct currently were deductible from the gross income in arriving at the net income from the property. The Supreme Court held that if such expenses were deducted in determining taxable net income, they should likewise be deducted in determining the net income upon which the depletion was to be based.

"The decisions are very important from a tax standpoint," Clark said, "because practically all oil companies exercised the election granted by the regulations and deducted such expenses currently. The effect of these decisions on the revenue is inestimable. These decisions are equally, if not more important in the field of administrative law. They hold that the treasury has power to change its regulations, at least prospectively, notwithstanding the re-enactment of the statute while the prior regulations were in effect."

Defense Consumers Group Warns Against Price Rises

Indirectly warning the oil industry against any increases in prices that cannot adequately be defended, Miss Harriet Elliott, commissioner in charge of the Consumers Division of the National Defense Advisory Commission, declared January 2 that "recent rises in the price of domestic fuel oil are not the result of the defense program, and there is no justification for a further rise."

The primary cause of the price increase, Miss Elliott said, is increasing demand for fuel oil for home, office and apartment heating, "providing an opportunity" to producers and distributors to secure higher prices.

The division report declared that shortage of tankers to transport oil from the Gulf to New England ports does not explain the price rise, asserting that tanker and storage facilities are adequate to take care of existing demand and pointing out that operating costs of tankers have not risen; insurance rates have not risen but have been lowered in some instances, and although wage rates have increased slightly, they constitute no more than 15 percent of the total costs of tanker operations.

"Tanker tonnage transferred to the navy and to foreign registry represents only about 13 percent of the total tanker capacity," it was stated.

"Published charter rates for tankers have increased, but 90 percent of the oil moving from Gulf ports to the Atlantic seaboard is transported in tankers belonging to large oil companies which do not pay the published charter rates. Apparently there has been no important increase in the costs of operating these tankers."

However, it was added, should the situation in tanker facilities eventually become critical, there are sources from which added facilities may be made available. Now under construction, some near completion, are 56 new tankers representing a capacity of over 500,000 tons; certain of the ships transferred to foreign registry could be made available under the recall provisions included in their transfer, and some of these could be made available to independent oil companies so that active competition might be maintained.

"Stocks of fuel oil in the hands of refining companies at the end of October were larger than stocks held at the same time a year earlier," Miss Elliott said. "The possibility that consumers may make provisions for other forms of heating in new construction and replacement will tend to restrain any further rises in fuel oil prices, according to the study.

"The consumer division is continuing its study of the present fuel oil situation with the view of suggesting action to the defense commission, to the producers and distributors, and to consumers of fuel oil. Conferences may be held later with members of the industry."

The investigation was undertaken as a result of complaints following increases in the price of No. 2 fuel oil from $6.13 per 100 gallons on September 15 to $7 on December 15 in Boston, from $6.12 to $6.89 in New York, from $6.33 to $6.75 in Philadelphia, and from $6 to $6.75 in Baltimore.

Control

Cole asks Continuation of Investigating Committee

Continuation of the petroleum subcommittee of the House Interstate and Foreign Commerce Committee until May 1, next, was provided in a resolution introduced and adopted by the House at the opening of the new Congress January 3.

The resolution followed a preliminary report by the committee in which additional time was asked to determine the defense position of the oil industry requested by President Roosevelt in November.

As the subcommittee has expended only about half of the $15,000 provided for its investigations, it was pointed out, the additional work now contemplated should not cost anything.

The report was brief, consisting of two paragraphs of explanation of the situation and the President's letter of November 29, in which he asked that consideration be given to the situation in the oil industry occasioned by world developments and our own defense program.

"The vital need for petroleum in the national defense, the importance in commerce and industry and the critical conditions in Europe and Asia confirm my belief in the urgent need of federal legislation to safeguard our petroleum supply through the prevention of waste and by the establishment and maintenance of sound economic conditions in the oil industry," President Roosevelt said at that time.

Cole explained that the subcommittee had prepared a "preliminary but very complete report" in addition to the voluminous hearings held during the past year and a half, but the President's letter prompted the group to decide that for the information of Congress "additional consideration should be given by the committee immediately to the question of petroleum in the national defense."

"Under these circumstances," he said, "the committee recommends that this report be accepted as preliminary to the final report to be filed with the next Congress as soon as completed."

Continuation of the subcommittee until May 1, next, was asked in a resolution introduced in the House at the opening of the new Congress January 3.

It was made clear that extension of the subcommittee's life was asked primarily in order that it might make the further study asked by the President, chiefly that members of the national defense advisory commission might have a chance to testify.

No definite plans have yet been made for the hearings, but it is expected they will be called sometime toward the end of this month or early in February. It was indicated that after relatively brief bearings, the subcommittee would close its investigation and prepare its report.

Refiners Group Asks Distillate Proration

The Gulf Coast Refiners Association last week called for extension of Texas proration laws to production of distillate. A resolution charging "the entire scheme of proration" was being threatened by uncontrolled distillate production was adopted by the association last week for submission to both houses of the legislature, convening January 14.

"It is the opinion of this association that the production of petroleum and the derivatives of crude petroleum by recycling plants constitutes, in effect, crude oil produced under no restriction and used in direct competition with crude oil subject to proration, and is an important factor in the determination of allowables for wells now subject to proration," the resolution said.

"The entire scheme of proration of production of crude petroleum is threatened by uncontrolled production by recycling plants of petroleum and the derivatives of petroleum," the resolution added.

The association asked "legislation which will place the production of petroleum and derivatives of petroleum and gas by recycling plants upon a ratable basis comparable to that for regulation of the production of crude petroleum now subject to proration laws."

"It is the opinion of this association that there can be no good reason for making any distinction between the production of petroleum distillates or derivatives of petroleum and gas in liquid form when there exists only a difference as to mechanics of getting the liquid out of the ground, and this same liquid is in direct competition with prorated crude petroleum and its derivatives."

Olin Culberson Sworn in as Texas Railroad Commissioner

Olin Culberson, sworn in January 2 as a member of the Texas Railroad Commission, declared "it is sincerely hoped that we shall always keep production within the estimates of the Bureau of Mines," and proclaimed "my unalterable opposition to federal control of the oil industry."

Presiding over the ceremony was Clifford Mooers. Those on the platform included Commissioner Jerry Sadler, and William Goldston and W. G. Byers, Texas oil men.

Culberson asked that the commission, at its first meeting of the year, adopt a resolution providing "that no order affecting any of the phases of the indus-

tries under the supervision of the commission shall ever be entered until ten days' notice to all parties concerned has been given, and an open public hearing has been held."

He added that "elimination from production schedules of every dead well in every field in Texas shall be one of my chief concerns."

After pledging attention to transportation and utility rate-fixing duties of the commission, Culberson added:

"The accomplishments of the commission, under the direction of the legislature through laws enacted by it for the commission's guidance, of a necessity are dependent to a great extent upon an efficient and energetic personnel which recognizes the responsibility reposed in and resting upon it. Without such an efficient and energetic personnel, success becomes impossible of attainment; without an efficient personnel that realizes to the fullest extent the necessity for the discharge of their respective duties in a fair, just and equitable way in all matters and to all persons coming within their obligation of duty, the commission can never hope to function as we all know it can and should. I shall at all times endeavor to assist in securing such services for the commission, and shall likewise oppose the retention of any personnel not fulfilling these qualifications.

"It is realized full well that the successful administration of the affairs under the jurisdiction of the commission is dependent, absolutely, upon the efforts of all three commissioners. As one commissioner, I sincerely trust that from now on it will indeed be a 'new commission' composed of three members. Harmony that does not strike fire occasionally is only for mollycoddles. And one who is sanguine enough to expect that every decision of the commission shall be unanimous is unaware of the many angles attaching to practically all problems confronting the commission, or does not realize that an active, vigorous supervision of the tremendous industries by the legislature through the Railroad Commission, must, of a necessity, frequently cause differences of opinion amongst the members of the commission. I believe that all orders affecting regulatory matters should be signed by all three commissioners, and where there is a difference of opinion that the dissenting member should endorse upon the order his reasons for dissenting therefrom.

"Lastly, may it be said that it is recognized fully that each commissioner has his responsibility of duty to discharge as his honest, considered judgment prompts him to do. I here now definitely want to state that I shall at all times recognize and respect that right and obligation upon the part of my colleagues, while at the same time reserving the same obligation to myself, but always keeping in mind that we are only the servants of the people, whose welfare we are bound to protect and whose legislative enactments we are obligated to observe and carry out.

"With these conceptions of duty and these convictions of principle I humbly enter upon the duties entrusted to me with every confidence that the commission, by is earnestness and application to duty and to the principles of justice, fairness and equity, shall demonstrate to Texans and their confidence shall have been well founded."

Allowables

Allowables for January Close to Market Demand

The program of allowables for January promises to hold the nation's production of crude oil fairly well in line with market demand.

If the allowables were rigidly adhered to, there would be almost complete balance between production and market requirements, as estimated by the United States Bureau of Mines. The eight prorated states, which supply about 84 percent of the country's requirements, have January allowables 11,522 barrels under the aggregate market demand for the oils from those states; while unprorated Illinois in the past month produced 9250 barrels a day less than the amount estimated as current market demand for Illinois crude.

Actual production does conform closely with the state allowables in most of the states, with exception of California. That state during the past month overproduced by 40,000 barrels daily the allowable that prevailed under the operators' voluntary proration program. And similar overproduction there may be expected in January. That excess would run up to approximately 1,250,000 barrels for the whole month, and it would constitute the bulk of the excess indicated for the United States.

The January allowable program calls for almost the same degree of curtailment as did the December schedules. But after a part of December had elapsed, the Texas Railroad Commission in a special order provided for an extra day of shutdowns of Texas fields, with the result that the nation's output conformed very closely with demand for the month as a whole, as evidenced by the fact crude stocks did not increase. In the absence of such unscheduled shutdowns, a somewhat less perfect balancing of production and demand is to be expected for January.

Details on the prescribed state allowables and estimates of demand by states appear in an accompanying table.

Defense

Aviation Gasoline Supply Is Ample

Ability of the petroleum industry to provide 100-octane aviation-grade gasoline for both defense and commerce is equal to any demand now indicated in the opinion of William S. Farish, president of Standard Oil Company (New Jersey) and chairman of the committee on defense policies of the American Petroleum Institute. His observation was made in a letter to executives of 15 large oil companies. Axtell J. Byles, Institute president, made the letter public and gave it this interpretation:

"The defense commission and the Army and Navy have only to provide adequate storage, order this gasoline and the petroleum industry will keep those tanks full."

Since the letter gives analysis what the industry can do, what it proposes to do and asks for guidance from government, it is quoted in full, as follows:

"I am writing each of you gentlemen because your company is known to us to be a producer of 100-octane gasoline.

"Recently Mr. J. Howard Pew, president of Sun Oil Company, raised the question with me as to the ability of the petroleum industry to produce 100-octane aviation gasoline today, and as to the probable quantity to be needed over the future by our government. He took up this matter with me because I am chairman of an Institute committee dealing with some defense problems—problems more particularly centered in the protection of refineries, storage, harbors, etc. in time of war. The question having been raised, it

January Allowables Conform with Market Demand

(Barrels Daily)

STATE	Bureau of Mines Estimate of Demand	State Allowable Beginning of Month	Difference of Allowable from Demand	Percent Difference of Allowable from Demand
Arkansas	66,100	70,666	— 4,566	— 6.9
California	594,800	571,000*	+23,800	+ 4.0
Kansas	191,000	194,000	— 3,000	— 1.6
Louisiana	287,400	292,756	— 5,356	— 1.9
Michigan	46,100	41,000†	+ 5,100	+11.1
New Mexico	100,000	104,000	— 4,000	— 4.0
Oklahoma	439,000	390,000	+ 49,000	+11.2
Texas	1,297,500	1,370,000‡	—72,500	— 5.6
Total 8 Prorated States	3,021,900	3,033,422	—11,522	— 0.38
Illinois	340,300	331,050§	+ 9,250	+ 2.7
Other States	228,800	.....	.....	.....
TOTAL UNITED STATES	3,591,000	.....	.....	.....

* Recommendation of Conservation Committe of California Oil Producers.

† Estimate of actual production that will occur under prescribed regulations, which do not fix a definite state total allowable.

‡ Estimated net basic daily allowables as of January 1. Railroad Commission estimates that actual production normally is about 3 percent under the allowable. But allowable normally increases as new wells are completed. Under December-January order, most Texas fields were ordered shut down January 1, 4, 5, 11, 12, 18, 19, 25, 26.

§ Average level to which unprorated Illinois production had naturally declined for 4 weeks, ended December 28, 1940.

seemed to me advisable that some attempt be made to analyze the entire 100-octane situation from a supply-and-demand viewpoint so as to understand just what problems might be met in the future concerning this question.

"Our people have made an attempt to check the producing capacity of the industry, and they are in agreement that the industry today can produce slightly in excess of 4,000 barrels daily of hydro-codimer and will have completed by March 1, 1941, about 16,000 barrels a day of alkylate production. This gives slightly in excess of 20,000 barrels a day of blending agents available March 1.

"There are in addition some 4,500 to 5,000 barrels of alkylate and hydro-codimer capacity, construction of which is being considered by various companies.

"It is our estimate that this 20,000 barrels daily of blending agents will produce something like 35,000 barrels daily of 100-octane gasoline. This would be higher if the best combination of blending agents and available base stock could be attained.

"Apparently there is no danger of shortage of base stocks. Our estimates show available industry base stock now to be 46,200 barrels daily, of which only 20,000 would be required in combination with the blending agents mentioned above. Additional supplies of base stocks could be made available on relatively short notice.

"In addition to this current picture, it it our judgment that the supply of 20,000 barrels of blending agents daily could be doubled within 12 to 14 months at a cost of approximately $1,500 per barrel/day of alkylate capacity. In other words, an investment of about $30,000,000 on the part of the oil-refining-industry would double the supply. This in turn would approximately double the supply of 100-octane gasoline. All that is required to get this 100 percent increase in capacity is for someone to order and agree to buy the additional gasoline.

"To complete this picture I think we should note that 100-octane capacity as described above is based on the use of a limit of 3 cc. of lead per United States gallon. Although there is still some difference of opinion in technical circles, we are of the opinion that up to 4½ cc. of lead per gallon could be used safely if the emergency warranted. This use of 4½ cc. of lead would increase supplies about 30 percent as against using 3 cc. of lead.

"Another point that I think should be noted in connection with the supply side of the picture is that up to the fall of 1941 we will have an excess supply of 100-octane production in the United States. Obviously, this excess supply should be bought and stored as fast as available so that no productive capacity is lost during this period. It is hoped that the government will purchase such excess supplies as are available promptly to insure maximum production during this time.

"It is probably impossible to make an accurate estimate of government demand for 100-octane gasoline. From our own estimates and from what information there is available, I am sure the production capacity of the industry, if fully utilized, is capable of supplying more than the government demand during the year 1941 plus the commercial and export demand. I have not attempted to estimate demand beyond 1941. Obviously, reliable estimates are not available.

"In addition to the government demand, we estimate the commercial plus export demand will run about 10,000 to 12,000 barrels daily. All of the above figures refer to the use of 100-octane gasoline. We expect the demand for 90-92-octane to be met easily from the available base stock supply.

"There are perhaps other questions, the answers to which are not available. One might well be the accuracy of the demand estimate. More training planes may need 100-octane than is now assumed. Commercial needs for 100-octane may grow apace with the Army and Navy needs. Other things not now foreseeable may show the present calculations to be amiss.

"As I understand the situation, this story is clear and the facts are all in the hands of the Defense Commission. The responsibility for the accuracy of the demand side of this program is one that the industry cannot assume. The Defense Commission and the War and Navy Departments have been advised just what the industry can do and just what it will be doing in the natural course of things and this should be the limit of the industry's responsibility. The responsibility for knowing what the demands of the government departments are going to be for high-octane gasoline must rest with these departments. As stated above, it is perfectly clear that greatly increased supplies of 100-octane can be had, provided someone contracts to buy the gasoline and the industry is given 12 to 14 months' time in which to build additional facilities.

"The industry has always met every demand made upon it, as evidenced by its record in the last war and in every emergency demand made upon it in peace-time. I am sure that in the present emergency we will meet any demand that may develop. All of us should be happy over the fact that our industry today constitutes no problem to the proper functioning of defense preparedness. There are no bottlenecks and there is no hesitation; we are ready to answer, fully and without delay, any call the government may make upon us."

Imports

Mexico Imports Under Low Rate Upped for 1941

Mexico's share of oil imported under terms of the Venezuelan reciprocal trade agreement will be increased by one-third for 1941 under a reallocation of quotas announced by the State Department December 31 in publishing a proclamation issued by President Roosevelt December 28.

To provide for expansion of cut-rate imports from Mexico, it was revealed, the proportion granted Venezuela and Colombia will be decreased. The Netherlands also is scheduled for a larger proportion of the total than it enjoyed during the year just ended.

The State Department explained that under the terms of the President's proclamation, the shares of the total imports of petroleum and fuel oil entitled to the reduction in import tax are allocated among the countries of supply on the basis of the proportions of the total imports for consumption in the United States supplied during the calendar year 1939.

As a result, the proportion granted Venezuela will be reduced from 71.9 to 70.4 percent; that for the Netherlands, including its overseas territory, will be increased from 20.3 to 21.3 percent; that for Colombia will be reduced from 4 to 3.2 percent, and that for "other foreign countries," which means Mexico, will be increased from 3.8 to 5.1 percent.

The President's proclamation did not set the quantity of oil which may be imported during the coming year at the reduced excise-tax rate. Under the agreement, the reduction is to be granted on imports not in excess of 5 percent of the total quantity of crude petroleum processed in refineries in the continental United States during the calendar year 1940. That figure will not be available for some weeks, but the Bureau of Mines production report for October indicates that the amount which may be imported will exceed that of 1940, on the basis of crude runs to stills which, for the ten months ended with October, amounted to 1,079,216,000 barrels in 1940 compared with 1,027,089,000 barrels in 1939.

The quota for 1940 was placed at 61,892,000 barrels, equivalent to 2,599,464,000 gallons, as being 5 percent of the total of 1,237,840,000 barrels processed in United States refineries during 1939. On the basis of the amount refined up to the end of last October, it would appear that the quota for 1941 will be in the neighborhood of 64,500,000 barrels. The 1940 quota figures were announced March 22, last, and it will probably be some time in March before the allocation for the current year is calculated.

On the basis of a total quota of 64,500,000 barrels, Mexico would be enabled to ship into the United States approximately 3,289,500 barrels by taking the full 5.1 percent allocated "other countries."

The Venezuelan agreement provides for a reduction from ½- to ¼-cent per gallon in the excise tax on imported crude petroleum, topped crude petroleum and fuel oil on quota imports, additional imports being subject to the full rate of tax. While the trade agreement was made specifically with Venezuela, all concessions made by the United States were, under our most-favored-nation policy, available to other countries with which we have such arrangements, including the Netherlands, Colombia, Mexico and Peru, although the last has not taken advantage of the opportunity to ship oil to this market.

Alberta Production Gains Materially in November

Production of oil in the Province of Alberta, Canada, totaled 877,165 barrels in November, a daily average of 29,239 barrels, as against 25,774 barrels in October, and 23,639 barrels in November, 1939.

Turner Valley continued to lead all producing districts in Alberta by accounting for 29,075 barrels of the November total daily yield.

A statement by F. K. Beach, of the Petroleum & Natural Gas Conservation Board, showed for the province 12 licenses issued, 13 new rigs up, and 39 rigs drilling, seven which had finished drilling, and four which have suspended operations.

Year-End Statements

Leaders Make Optimistic Forecasts for New Year

The oil industry's ability to meet national defense needs was stressed, and optimistic views into the new year were taken by industry leaders last week. The American Petroleum Institute, through its president, declared the industry was better equipped than any other industry to meet national defense needs. Heads of Standard Oil Company (New Jersey) and Phillips Petroleum Company predicted increases in consumption of petroleum products during 1941, and greater profits for the industry.

Byles Says Industry Proven Ready for National Crisis

"Ability of the petroleum industry to take its place in the national defense program with fewer readjustments than any other basic industry was indicated again by the 1940 production and consumption of petroleum products," said Axtell J. Byles, president of the American Petroleum Institute. "Although these demands exceeded by a substantial margin all previous records in the history of the industry, they easily were filled without straining of capacity.

"Not only is the petroleum industry ready, with minor changes, to fill all normal and anticipated increased needs for its own vitally-important products, government surveys of its capacities have revealed, but in 1940 it began the commercial production from petroleum of synthetic substitutes for other essential substances, chief among them toluene, rubber, and glycerin," Byles added. "The United States alone, among the nations of the world, can produce the quantities and qualities of super aviation fuel needed for maximum military effectiveness.

"Virtually every production, manufacturing and consumption record of the industry was broken in 1940, the year-end analysis reveals. More oil was produced, more refined products were manufactured, and the United States consumed more petroleum products, than ever before in the 80-year history of the industry. United States consumption averaged almost 1800 gallons per family.

"Underground oil reserve inventories at the beginning of the year were higher than at any previous time, reflecting oil discoveries that during the last five years have been more than twice as great as production. The price of the industry's chief product, motor fuel, declined to the lowest point, except for 1933, since 1919, although the highest average gasoline taxes ever levied kept at a high level the cost of motor fuel to the consumer.

"The modern refining processes, like catalytic cracking, polymerization, alkylation, isomerization and aromatization, which have been responsible for the production of the finest aviation fuels and for the synthetic rubber, toluene, glycerin and other basic industrial chemicals, were extended and improved during 1940. Many of these processes use as a raw material the by-product refinery gases which until relatively recently had no apparent use except as a heating fuel.

"During 1940, the industry began to feel the full effects of the war. Exports, contrary to the expectations of some, declined materially from 1939. Loss of Central European markets, strict rationing of petroleum products throughout most of the world outside the Western Hemisphere, availability of substantial Asian and South American supplies to Great Britain and her allies, governmental embargoes of some products, and the use of exchange credits for products not available elsewhere undoubtedly account for the large declines. Motor fuel exports particularly were affected and dropped more than 40 percent from 1939, because of decreased foreign purchases and, to some extent, the embargoes and export licensing of our own government. Crude oil shipments abroad declined 24 percent, and refined products as a whole, 32 percent.

Governmental Investigations as Usual

"As usual, the industry continued to find itself in the goldfish-bowl of governmental investigation. Testimony by oil-state executives and industry experts before the Cole committee early in 1940 detailed the conservation progress made by the industry itself and by state regulation in most of the leading oil states, and showed that no emergency or lack of adequate conservation warrant the federal control of the industry which the Cole bill seeks. The Interstate Oil Compact Commission continued to strengthen its conservation activities during the year. With the decline in production in Illinois, only major oil state without some legislative or voluntary oil conservation control, enactment soon of adequate state regulation there is forecast.

"A survey of the capacity of the petroleum industry late in 1940 by Dr. Robert E. Wilson, industry representative on the advisory commission to the Council of National Defense, revealed that 'no industry of comparable importance to defense has so few even potential bottlenecks as has the petroleum industry.

"Committees of the American Petroleum Institute, appointed at the request of the commission, already have begun consideration of oil-storage defense problems.

"Crude-petroleum production increased nearly 7 percent in 1940, to 1,354,423,000 barrels, compared with 1,264,962,000 barrels in 1939, preliminary estimates indicate. Outside the United States, however, a decline of 2 percent dropped production to an estimated 795,318,000 barrels, for a world total production of 2,149,741,000 barrels. The United States proportion of the world total therefore increased slightly, to 63 percent. Under conservation regulations, wells in many leading oil states are producing at only a fraction of their immediately-potential capacities; in an emergency they could be opened up at a moment's notice to meet any conceivable increased needs.

Refinery Runs Up 4 Percent

"The country's refineries processed 1,291,516,000 barrels of crude oil in 1940, an increase of 4 percent over 1939. These crude runs did not nearly reach the refinery capacity which, on January 1, 1940, totaled 4,721,213 barrels daily. The shut-down capacity alone, 431,952 barrels daily, it has been pointed out, is greater than the entire refining capacity of the industry in 1917.

"Production of motor fuel in 1940 totaled 614,459,000 barrels, against 611,043,000 barrels in 1939. Light fuel oils (gas oil and distillates) rose more than 10 percent, to 179,123,000 barrels, and residual fuel oil 3 percent, to 316,668,000 barrels.

"Domestic demand for motor fuel increased 6 percent, from 555,509,000 barrels in 1939 to 590,737,000 barrels in 1940. Motor-fuel exports, however, dropped to 24,919,000 barrels from 44,638,000 barrels in 1939, a decrease of 44 percent. Consumption of light fuel oils showed the greatest increase of any of the major petroleum products, a gain of more than 18 percent to 164,571,000 barrels. This reflects the continually growing demand for heating oil for domestic oil burners. Increased installations of these burners combined during the early part of 1940 with weather much colder than in 1939 to increase consumption tremendously.

"Drilling of wells increased 9 percent from 1939, to 30,264 wells; of these 21,277 were completed as oil wells, and 2224 as gas wells. The amount of crude oil in storage at the end of the year rose by 321,000 barrels to an estimated 263,000,000 barrels; at the end of 1939 these stocks had dropped to the lowest point in 18 years. Crude-oil prices, as indexed by the 36-degree Oklahoma-Kansas price, remained at $1.02 a barrel throughout 1939; no estimates of the nation-wide average per-barrel price are available, but it is expected to approximate the 1939 average, $1.02.

Wholesale Prices Down

"Wholesale prices of petroleum products, according to the United States Bureau of Labor Statistics, again were far below the average for all commodities, and dropped 4 percent in 1940 from 1939. The 1940 petroleum-product average was 50.0, compared with 78.3 for all commodities. These indexes are based on 1926 as 100.

"The average retail price of motor fuel in 50 representative United States cities dropped in 1940 to the lowest level, except for 1933, since prices first were collected in 1919. The year's average was 12.75 cents, compared with 13.31 cents in 1939, the all-time low of 12.41 cents in 1933, and the all-time high of 29.74 cents in 1920. The highest average gasoline taxes ever levied, 5.66 cents a gallon, kept at a high level in 1940 the cost of motor fuel to the consumer.

"Total gasoline taxes have increased steadily in recent years, passing the billion-dollar mark for the first time in 1939. It is estimated that state and federal gasoline levies in 1940 amounted to $1,146,000,000, of which $868,000,000 was contributed to the states and $278,000,000 to the federal government. The federal levy represents an increase of one-third over 1939, reflecting the 50 percent increase in the tax (to 1½ cents a gallon) effected July 1, 1940. Total petro-

leum taxes, it is estimated, amounted nearly to $1,500,000,000.

"The average motor vehicle, it is estimated, consumed 740 gallons of motor fuel in 1940, an increase of 12 gallons from 1939, and of 240 gallons from 1920. Price of the 740 gallons bought in 1940, however, on the average, was only $94.35, compared with a total 1920 cost for only 500 gallons of $148.70. Taxes in this same period increased, for the average motor vehicle, from 45 cents in 1920 to $41.88 in 1940, equivalent to a cost-increase of more than 44 percent for the consumer on his 1940 fuel bill."

Farish Sees Big Increase In Domestic Consumption

A greater increase in consumption of petroleum products in 1941 than occurred for 1940 over 1939, when production increased 6.6 percent and refinery runs were upped 4.2 percent, was predicted last week by W. S. Farish, president of Standard Oil Company (New Jersey).

"A most significant change in the petroleum industry during 1940 was the large reduction in exports caused by the war," Farish said in reviewing the past year. "Exports of crude and all products decreased 32 percent. The volume of Atlantic and Gulf Coast exports decreased more than total exports, or by 52 percent. At the present time, shipments to Europe are confined primarily to Great Britain.

"Domestically, the industry expanded," he added. "Crude oil production increased 6.6 percent to reach a new high of 3,700,000 barrels per day. Refinery runs increased only 4.2 percent, and this, plus reduction in exports of crude, will result in an addition to crude oil stocks of approximately 25,000,000 barrels. This reverses the trend of the two preceding years, when substantial drafts were made on crude oil stocks above ground. Such stocks, estimated at 277,000,000 barrels on December 31, are somewhat higher than necessary, as evidenced by the level existing at the same time last year of 252,000,000 barrels.

"Total 1940 domestic demand for petroleum products will be about 7.2 percent over the previous year, with lubricating oil showing the smallest gain (1.4 percent) and gas oil and distillate the largest percentage-wise (17.2 percent). Considering the loss in exports, the total demand for crude and petroleum products will be about 2 percent higher than in 1939. Domestic gasoline demand for the year should approximate 589,000,000 barrels, or 6.3 percent over last year, and total demand after considering the reduction in gasoline exports will approximate 2.4 percent over 1939 total demand. At the end of the year, finished and unfinished motor fuel stocks, estimated at 85,000,000 barrels, will be approximately 2,000,000 barrels higher than at the close of 1939. Estimates of adequate minimum working levels of motor fuel stocks are variable, but on the basis of the average of such estimates the above stocks as of the first of the year will be at least 15,000,000 barrels on the high side.

Gasoline Stocks Increase Steadily

"There has been a steady increase in gasoline stocks over the last six years. On January 1, 1934, these were 52,500,000 barrles, or 32,500,000 barrels less than is now on hand. It will be remembered that gasoline stocks increased substantially over and above the normal seasonal accumulation during the fall of 1939, and the first quarter of 1940, partly because of the anticipated war demand, which did not materialize, and partly because of excess gasoline production obtained when crude was run to produce additional heating oils. It is apparent that this accumulation which took place has not been corrected. This is reflected by present low prices in the wholesale gasoline markets, as well as the fact that the average service station price of gasoline, ex tax, on December 1, 1940, was 12.09 cents a gallon, which is the lowest it has ever been at this time of the year. Crude prices have remained at substantially the same level as in 1939, despite the generally lower product prices.

"Heating oil stocks are now some 10,000,000 barrels, or 30 percent, greater than they were a year ago, and are adequate to meet demands, even if the weather this winter should be as cold as that of the abnormal winter last year. During the year, industry demonstrated its ability to increase yields on heating oils, and thus meet additional demand requirements without adding unnecessarily to gasoline supplies. The use of distillate oil for domestic heating purposes continues to expand at a rapid rate, as evidenced by the 21 percent increase in domestic burner sales estimated for 1940.

1940 Outlook Good

"The increase in the use of distillate fuels for domestic heating has resulted in creating a higher requirement for tanker transportation from the Gulf to the Atlantic seaboard in the winter than in summer. This emphasizes the importance of accumulating stocks of such oils on the Atlantic seaboard during the summer months to avoid such peak requirements.

"In the coming year, increased business activities should occasion a greater increase in total consumption than occurred for 1940 over 1939, despite the fact that exports are not expected to gain. From a statistical standpoint, stocks of crude and products, particularly gasoline, are high in relation to demand. This position, however, would seem to be within the range of reasonable adjustment in refinery crude runs and crude oil supplies to bring about a balanced situation."

Phillips Says Profit Was Maintained Despite Prices

Oil-industry profits for 1940 will equal or moderately exceed those of the previous year, Frank Phillips, board chairman of Phillips Petroleum Company, said in a year-end statement that described current conditions better than a year ago to indicate an increase in profits for 1941.

"It is significant that profits were maintained at the 1939 level in spite of lower gasoline prices and a 30 percent decrease in exports," Phillips said.

"The decline in gasoline prices resulted from over-production of crude oil and gasoline," he said. "Over-production of crude oil was due largely to the unregulated crude-oil production in Illinois. Over-production of gasoline resulted principally from two causes: first, the excessive refining to overcome a shortage of burner oils, and second, excessive refining to supply an expected export demand which never materialized.

"Export demand during 1940 was 30 percent below the previous year, but domestic demand increased 7½ percent, reaching a new record high. This increase in domestic business not only absorbed the total loss in exports, but brought the net gain in total demand (domestic and export) to 2.5 percent above 1939.

"Crude oil production, however, was 8 percent higher, resulting in the accumulation of additional stocks.

"A decrease in exports of 57,000,000 barrels during 1940 and an increase in imports of 22,000,000 barrels resulted in a loss of 79,000,000 barrels in our export-import position. This was equal to 5 percent of the total demand and contributed to the unbalancing of supply with demand.

"Fortunately, many of the retarding conditions that existed during the past year have been remedied. During the last six months of 1940, oil production in Illinois decreased from a peak of 518,000 barrels a day to 325,000 barrels a day, and further reduction is expected.

"Shortages in inventories of burner oils have been largely overcome. These stocks are now 22 percent larger than a year ago, and are ample to meet increasing demand without requiring excessive refining that would cause an unneeded increase in gasoline stocks.

"Today, the industry has a better understanding of export conditions than it had a year ago. Foreign sales have been reduced to where they now represent only 9 percent of our total demand, and most observers are anticipating some further decline. It now appears certain that demand during the coming year will reach another record high, with sufficient increase to more than absorb any further loss in exports.

"With the principal causes of over-production in 1940 largely removed, and with prospects for increasing volume, the industry is in a much better position to balance supply with demand during the coming year. Few other industries vital to national defense are better situated to serve the nation's requirements. There is no bottleneck in the production or transportation of essential petroleum products.

"Stocks of the finest aviation gasoline in the world are ample for early prospective needs," Phillips added, "and the industry is capable of rapidly increasing facilities to meet any demand. The industry can fill all military requirements and at the same time supply the ever-increasing normal consumption. Despite the influence of anti-trust suits and threats of government control, the industry should continue as one of the leaders in American business, maintaining its splendid record of growth and service to the consuming public while preserving the security of its investments."

Gas Producers Association Organized in Eastern Kansas

The Gas Producers Association has been organized by operators in the shallow gas territory of Eastern Kansas and Missouri. Principal purpose of the association is to promote better cooperation between pipe line companies and producers.

TEXT OF

Oil and Gas Conservation Law

PROPOSED BY INTERSTATE OIL COMPACT COMMISSION

The Interstate Oil Compact Commission last week adopted a model conservation law, which it hopes all oil-producing states will adopt to provide uniformity. Plans are being made to have the bill introduced in the various state legislatures.

The text of the bill follows:

A suggested Oil and Gas Conservation Law submitted by the Interstate Oil Compact Commission containing provisions suitable for adoption in any state:

Declaration of Policy—It is the declared policy of the State to provide by this Act for the conservation of the oil and gas resources in the State, for the protection and adjustment of the correlative rights of the owners and producers of oil and gas resources, and of others interested therein, and for all other purposes indicated by the provisions of this Act. It is not, however, the intention of this Section to limit or restrict or modify in any way the provisions of this Act.

Section 1. Unless the context otherwire requires, the words defined in this Section shall have the following meaning when found in this Act:

(a) "Waste," in addition to its ordinary meaning, shall mean "physical waste" as that term is generally understood in the oil and gas industry. The meaning of "waste" shall include (1) the inefficient, excessive, or improper use or dissipation of reservoir energy; and the locating, spacing, drilling, equipping, operating, or producing of any oil or gas well or wells in a manner which results, or tends to result, in reducing the quantity of oil or gas ultimately recoverable from any pool in this State under prudent operations; and (2) the inefficient storing of oil; the producing of oil or gas in excess of transportation or marketing facilities or of reasonable market demand; the locating, spacing, drilling, equipping, operating, or producing of a well or wells in a manner causing, or tending to cause, unnecessary or excessive surface loss or destruction of oil or gas, and the use of gas from a well producing gas only for the manufacture of carbon black or similar products predominantly carbon unless authorized under Section 4 of this Act.

(b) The words "reasonable market demand," as used herein, shall mean the demand for oil or gas for reasonable current requirements for current consumption and use within and outside the State, together with such amounts as are reasonably necessary for building up or maintaining reasonable storage reserves of oil or gas or the products thereof, or both such oil or gas and products.

(c) "Commission" shall mean the "Conservation Commission of the State of _____."

(d) "Person" shall mean any natural person, corporation, association, partnership, receiver, trustee, executor, administrator, fiduciary, or representative of any kind.

(e) "Oil" shall mean crude petroleum oil and other hydrocarbons, regardless of gravity, which exist in the reservoir in liquid form, and which remain in liquid form throughout the range of temperature and pressure between reservoir conditions and atmospheric conditions.

(f) "Condensate" shall mean hydrocarbons existing in a gaseous state in the reservoir, but condensing to a liquid at pressures or temperatures below those of the reservoir, at the well under ordinary well producing methods. For the purpose of brevity, the use herein of the word "oil" shall include condensate as defined in this subsection, unless otherwise provided or unless the context shows a different meaning. For instance, "oil well" shall mean not only an oil well but also a condensate well.

(g) "Gas" shall mean all natural gas, including casinghead gas, and all other fluid hydrocarbons not defined as oil or condensate in subsections (e) and (f) above.

(h) "Pool" shall mean an underground reservoir containing, or appearing to contain, a common accumulation of oil or gas, or both. Each zone of a general structure which is completely separated from any other zone in the structure is covered by the term "pool" as used herein.

(i) "Field" shall mean the general area which is underlaid or appears to be underlaid by at least one pool; and "field" shall include the underground reservoir or reservoirs containing oil or gas, or both. The words "field" and "pool" mean the same thing when only one underground reservoir is involved; however, "field," unlike "pool," may relate to two or more pools.

(j) "Owner" shall mean the person who has the right to drill into and to produce from any pool, and to appropriate the production either for himself or others, or for himself and others.

(k) "Producer" shall mean the owner of a well or wells capable of producing oil or gas, or both oil and gas.

(l) "Product" means any commodity made from oil or gas, and shall include refined crude oil, crude tops, topped crude, processed crude petroleum, residue from crude petroleum, cracking stock, uncracked fuel oil, fuel oil, treated crude oil, residuum, gas oil, casinghead gasoline, natural gas gasoline, kerosene, benzine, wash oil, waste oil, blended gasoline, lubricating oil, blends or mixtures of oil with one or more liquid products or by-products derived from oil or gas, and blends or mixtures of two or more liquid products or by-products derived from oil or gas, whether hereinabove enumerated or not.

(m) "Illegal oil" shall mean oil which has been produced within the State from any well or wells in excess of the amount allowed by any rule, regulation, or order of the Commission, as distinguished from oil produced within the State not in excess of the amount so allowed by any such rule, regulation, or order, which is "legal oil."

(n) "Illegal gas" shall mean gas which has been produced within the State from any well or wells in excess of the amount allowed by any rule, regulation, or order of the Commission, as distinguished from gas produced within the State not in excess of the amount so allowed by any such rule, regulation, or order, which is "legal gas."

(o) "Illegal product" shall mean any product of oil or gas, any part of which was processed or derived, in whole or in part, from illegal oil or illegal gas or from any product thereof, as distinguished from "legal product," which is a product processed or derived to no extent from illegal oil or illegal gas.

(p) "Tender" shall mean a permit or certificate of clearance for the transportation of oil, gas, or products, approved and issued or registered under the authority of the Commission.

(q) A "proration unit" means the maximum area in a pool which may be efficiently and economically drained by one well.

(r) A "developed area" or "developed unit" means a "proration unit" having a well completed thereon which is capable of producing oil or gas in paying quantities; however, in the event it be shown, and the Commission finds, that a part of any unit is nonproductive, then the developed part of the unit shall include only that part so found to be productive.

Section 2. (a) Waste of oil and gas as defined in this Act is hereby prohibited.

(NOTE: If it is desired to authorize the Commission to restrict each producer to his fair share, independent of any regulation based on waste, the provision set forth hereafter in subsection (b) may be used.

(b) The production of oil or gas by any producer in excess of his just and equitable share of the oil or gas in a pool, as defined in this Act, is herby prohibited. The Commission is authorized to restrict and allocate the production of oil or gas, or both, within any pool, independently of waste, for the purpose of giving each producer his just and equitable share of the oil or gas in the pool. If this authority should conflict with the exercise of any other power delegated in this Act, the two shall be harmonized; however, in the event the conflict is with the provisions relating to waste, the latter shall control, if reasonable under all the circumstances.)

If it is not desired (b) may be deleted.

(c) The Commission shall have jurisdiction and authority over all persons and property, public and private, necessary to enforce effectively the provisions of this Act and of other acts relating to the conservation of oil or gas or both oil and gas.

(d) The Commission shall have authority and it shall be its duty to make such inquiries as it may think proper to determine whether waste, over which it has jurisdiction, exists or is imminent, or whether other facts exist which justify any action by the Commission. In the exercise of such power, the Commission shall have the authority to col-

lect data; to make investigations and inspections; to examine properties, leases, papers, books, and records; to examine, survey, check, test, and gauge oil and gas wells, tanks, refineries, and modes of transportation; to hold hearings; and to provide for the keeping of records and the making of reports; and to take such action as may be reasonably necessary to enforce this Act.

Section 3. The Commission shall have authority to make, after notice and hearing as hereinafter provided, such reasonable rules, regulations, and orders as may be necessary from time to time in the proper administration and enforcement of this Act, including rules, regulations, or orders for the following purposes:

(a) To require the drilling, casing, and plugging of wells to be done in such a manner as to prevent the escape of oil or gas out of one stratum to another; to prevent the intrusion of water into oil or gas strata; to prevent the pollution of fresh water supplies by oil, gas, or salt water; and to require reasonable bond with good and sufficient surety conditioned for the performance of the duty to plug each dry or abandoned well.

(b) To require the making of reports showing the location of all oil and gas wells, and the making and filing of logs, and the taking and filing of directional surveys, the filing of electrical logs of oil and gas wells if taken, and the making of reports with respect to drilling and production records; provided that, at the option of the Commission, such information or any part thereof may be held confidential for ninety (90) days after the completion of a well.

(NOTE: The following could be substituted for the promise above: "provided that, such information, or any part thereof, at the request of the operator shall be held confidential by the Commission for a period of ninety (90) days after the completion of a well, and at the option of the Commission for a longer period.")

(c) To prevent wells from being drilled, operated, or produced in such a manner as to cause injury to neighboring leases or property.

(d) To prevent the drowning by water of any stratum or part thereof capable of producing oil or gas in paying quantities, and to prevent the premature and irregular encroachment of water which reduces, or tends to reduce, the total ultimate recovery of oil or gas from any pool.

(e) To require the operation of wells with efficient gas-oil ratios, and to fix such ratios.

(f) To prevent "blowouts," "caving," and "seepage" in the sense that conditions indicated by such terms are generally understood in the oil and gas business.

(g) To prevent fires.

(h) To identify the ownership of all oil or gas wells, producing leases, refineries, tanks, plants, structures, and all storage and transportation equipment and facilities.

(i) To regulate the "shooting" and chemical treatment of wells.

(j) To regulate methods for secondary recovery, recycling of gas, and maintenance of pressure, including introduction of gas, water, or other substances into a producing formation.

(k) To limit and prorate the production of oil or gas, or both, from any pool or field, and to establish proration units, in order to administer this Act.

(l) To regulate the spacing of wells, including temporary or tentative spacing rules.

(m) To require, either generally or with respect to particular areas, certificates of clearance or tenders in connection with the transportation of oil, gas, or any product.

(n) To require that the production from wells be separated into gaseous hydrocarbons and liquid hydrocarbons, and that each be accurately measured by such means and upon such standards as may be prescribed by the Commission.

(o) To make rules, regulations, or orders for the classification of wells for any purpose, including wells drilled or to be drilled for geological information, or injection wells for any purpose.

Section 4. (a) The use from a well producing gas only, or from a well which is primarily a gas well, for the manufacture of carbon black or similar products predominantly carbon, is declared to constitute waste prima facie, and such gas shall not be used for any such purpose unless it be clearly shown, at a public hearing to be held on application of the person desiring to use such gas, that waste would not take place by the use of such gas for the purpose or purposes applied for, and that gas which would otherwise be lost is not available for such purpose or purposes, and that the gas to be used cannot be used for a more beneficial purpose, such as for light or fuel purposes, except at prohibitive cost, and that it would be in the public interest to grant such permit. If the Commission finds that the applicant has clearly shown a right to use such gas for the purpose or purposes applied for, it shall issue a permit upon such terms and conditions as may be found necessary in order to permit the use of the gas, and at the same time require compliance with the intent of this Section. If, at the time this Act becomes effective, plants are already being operated for the manufacture of carbon black or similar products predominantly carbon, then the owner of each such plant shall, within sixty (60) days after this Act becomes effective, apply for a permit under this Act, and a preferential right is declared to exist in the owner of a plant now operating to secure a permit before a permit is issued for the operation of a new plant.

Section 5. The Commission is authorized to permit the recycling of gas in any pool or portion thereof, and is also authorized to permit the introduction of gas or other substance into an oil or gas reservoir for the purpose of repressuring such reservoir, maintaining pressure, or carrying on secondary operations.

(NOTE: The following is recommended as a possible alternative for Section 5:

Section 5. The Commission may permit or require the recycling of gas in any pool or portion thereof; and it is also authorized to permit or require the introduction of gas or other substance into an oil or gas reservoir for the purpose of repressuring such reservoir, maintaining pressure, or carrying on secondary recovery operations.)

Section 6. (a) The Commission shall prescribe the rules of order or procedure in hearings or other proceedings before it under this Act.

(b) No rule, regulation, or order, including change, renewal, or extension thereof, shall, in the absence of an emergency, be made by the Commission under the provisions of this Act except after a public hearing upon at least ten days' notice given by publication in some newspaper of general circulation in the State in the manner and form as may be prescribed by the Commission, and by such other method as may be prescribed by the Commission by general rule. Such public hearing shall be held at such time, and at such place, and in such manner as may be prescribed by the Commission, and any person having any interest in the subject matter of the hearing shall be entitled to be heard.

(c) In the event an emergency is found to exist by the Commission, it may make, change, renew, or extend any rule, regulation, or order, without notice and a hearing, and its act shall have the same validity as if a hearing with respect to the same had been held after due notice. The emergency rule, regulation, or order permitted by this section shall remain in force no longer than fifteen (15) days from its effective date; and, in any event, it shall expire when the rule, regulation, or order made after due notice and hearing with respect to the subject matter of such emergency rule, regulation, or order becomes effective.

(d) Should the Commission elect to give notice by personal service, such service may be made by any officer authorized to serve process, or by any agent of the Commission, in the same manner as is provided by law for the service of citation in civil actions in the district courts of this state. Proof of the service by such agent shall be by the affidavit of the person making personal service.

(e) All rules, regulations, and orders made by the Commission, shall be in writing and shall be entered in full in a book to be kept for such purpose, which book shall be a public record and be open for inspection at all times during reasonable office hours. A copy of such rule, regulation, or order certified by a member of the Commission, or the secretary, shall be received in evidence in all courts of this state with the same effect as the original.

(f) Any interested person shall have the right to have the Commission call a hearing for the purpose of taking action in respect of any matter within the jurisdiction of the Commission by filing a petition therefor in writing, setting up in substance the nature of order, rule, or regulation requested. Upon receipt of any such request the Commission shall promptly call a hearing thereon, and after such hearing, and with all convenient speed, and in any event within twenty (20) days after the conclusion of such hearing, shall take such action with regard to the subject matter thereof as it may deem appropriate. In the event of failure or refusal of the Commission to issue a rule, regulation, or order within such period of twenty (20) days following the conclusion of such hearing, (1) it may be compelled to do so by mandamus at the suit of any interested person within thirty (30) days following the expiration of said twenty (20) day period, and, if mandamus issue, the costs may be assessed against the members of the Commission who failed or refused to act, or (2) with respect to any person who does not institute a suit for mandamus, it shall be presumed that the application has been overruled.

Section 7. (a) Whether or not the total production from a pool be limited or prorated, no rule, regulation, or order

ot the Commission shall be such in terms or effect (1) that it shall be necessary at any time for the producer from, or the owner of, a tract of land not larger than a proration unit, in order that he may obtain such tract's just and equitable share of the production of such pool, as such share is set forth in this Section, to drill and operate any well or wells on such tract in addition to such well or wells as can without waste produce such share, or (2) as to occasion net drainage from a tract because there has not been drilled and operated upon such a tract a well or wells in addition to such well or wells thereon as can without waste produce such tract's just and equitable share, as set forth in this Section, of the production of such pool.

(b) For the prevention of waste or to avoid the drilling of unnecessary wells or otherwise to administer properly this Act, the Commission shall establish proration units in each pool, as defined in this Act.

(c) Subject to the reasonable necessities for prevention of waste, and to reasonable adjustment because of structural position, a producer's just and equitable share of the oil and gas in a pool (also sometimes referred to as a tract's just and equitable share) is that part of the authorized production for the pool which is substantially in the proportion that the quantity of recoverable oil and gas in the developed area of his tract or tracts in the pool bears to the recoverable oil and gas in the total developed area of the pool, insofar as these amounts can be practically ascertained; and to that end, the rules, regulations, and orders of the Commission shall be such as will prevent or minimize reasonably avoidable net drainage from each developed area (that is, drainage which is not equalized by counter drainage), and will give to each producer the opportunity to use his just and equitable share of the reservoir energy.

(d) A rule, regulation, or order, except for a stripper pool, which provides for the distribution of the allowable production of a pool wholly or substantially on a per-well basis, or on a per-well-potential basis, shall be prima facie invalid unless it be shown that eighty percent (80%) of the operators in the pool, owning as much as eighty percent (80%) of the developed area, recommended such method of distribution; and in the event of such recommendation, a rule, regulation, or order based thereon shall be only prima facie valid.

(e) Unless a different well-spacing plan be authorized by this Act, each well permitted to be drilled upon any proration unit shall be drilled approximately in the center thereof, with such exception as may be reasonably necessary where it is shown, after notice and upon hearing, and the Commission finds, that the unit as established is partly outside the pool, or is partly nonproductive, or, for some other reason, a well approximately in the center of the unit would be nonproductive, or where topographical conditions are such as to make the drilling in the center of the unit unduly burdensome. Whenever an exception is granted, the Commission shall take such action as will offset any advantage which the person securing the exception may have over other producers by reason of the drilling of the well as an exception, and so that drainage from developed areas to the tract with respect to which the exception is granted will be prevented or minimized; and so that the producer of the well drilled as an exception will be allowed to produce no more than his just and equitable share of oil and gas in the pool, as such share is set forth in this Section.

(f) Whenever the Commission finds, after notice and a hearing, that conditions in a pool are such that reasonably uniform spacing would be impracticable, or that more than one well should be permitted to be drilled on each proration unit, the Commission is authorized to make exception to the uniform spacing plan contemplated in the foregoing subsections of this Section; however, no exception should be made unless the necessity therefor clearly appears, and, whenever exception is made, the Commission shall adjust the allowable production for the pool and the proration units therein, and take such other action as may be necessary so that the rules, regulations, and orders will be in compliance with the provisions of subsections (a) and (c) of this Section.

Section 8. (a) When two or more separately owned tracts of land are embraced within a proration unit which has been established by the Commission as provided for in Section 6, the owners thereof may validly pool their interests and develop their lands as a unit. Where, however, such owners have not agreed to pool their interests, the Commission, for the prevention of waste, or to avoid the drilling of unnecessary wells, or to prevent confiscation, or to administer more effectively this Act, may require such owners to pool and to develop their lands in the proration unit as a unit. All orders requiring such pooling shall be made after notice and hearing; and shall be upon terms and conditions that are just and reasonable, and will afford to the owner of each tract in the unit the opportunity to recover or receive without unnecessary expense his just and equitable share as set forth in Section 7 of this Act. The portion of the production allocated to the owner of each tract included in a proration unit formed by a pooling order shall, when produced, be considered as if it had been produced by such owner from such tract by a well drilled thereon.

(NOTE: If it is desired that pooling be mandatory the following substitute language may be used: "the Commission * * * shall require such owners to pool and to develop their lands in the proration unit as a unit.")

(b) In the event such pooling is required, then, unless the agreement of the owners of separate tracts in the proration unit, or the order of the Commission, makes definite provision for the cost of development and operation, the cost of developemnt and operation of the pooled unit chargeable by the operator to the other interested owner or owners shall be limited to the actual expenditures required for such purpose, not in excess of what are reasonable, including a reasonable charge for supervision. In the event of any dispute relative to such costs, the Commission shall determine the proper costs, after due notice to all interested parties and hearing thereon.

(c) Whenever the pooling plan provides that one or more of the owners shall drill or pay the expense of drilling or operating the well for the benefit of all, then the owner or owners so drilling or operating shall have a lien on the mineral estate or rights owned by the other owners in the proration unit for whose benefit the well is drilled or operated, and upon their shares of the production from such unit. Such lien may be foreclosed as provided for with respect to laborers', materialmen's, or contractors' liens upon leases, estates, rights, or interests relating to oil or gas, or as provided for with respect to foreclosure of a mortgage on land. The Commission is specifically authorized to require that the owner or owners drilling or paying for the drilling or operating of the well for the benefit of all shall be entitled to the production from such well which would be received by the owner or owners for whose benefit the well was drilled or operated, after payment of royalty, until the owner or owners drilling or operating the well have been paid the amount due under the terms of the pooling plan, calculating the value of the production on the posted market price for such production in the pool, if there be such a price, and if there be no posted market price, then at the reasonable market value at the well.

(d) Should the owners of separate tracts embraced within a proration unit fail to agree upon the pooling of the tracts and the drilling of a well on the unit, and should it be established by final and unappealable judgment of a court of competent jurisdiction that the Commission is withotu authority to require pooling as provided for in this Section, then, subject to all other applicable provisions of this Act, the owner of each tract embraced within the proration unit may drill on his separately owned tract but the allowable production therefrom shall be such proportion of the allowable for the full proration unit as the area of such separately owned tract bears to the full proration unit.

Section 9. Whenever the Commission fixes the location of any well or wells on the surface, the point at which the maximum penetration of such well into the producing formation is reached shall not unreasonably vary from the vertical drawn from the center of the hole at the surface, provided, that the Commission shall prescribe rules, regulations, and orders governing the reasonableness of such variation.

Section 10. (a) Whenever the total amount of oil which all the pools in the State can produce exceeds the amount reasonably required to meet the reasonable market demand for oil produced in this State, then the Commission shall limit the total amount of oil which may be produced in the State by fixing a state allowable. The Commission shall then allocate or distribute the allowable production among pools. In making such allocation or distribution among the pools of the State the Commission shall give due consideration, among other proper factors, to the acreage in pools, the time required to produce the recoverable oil in pools, and the prevention of waste; and shall avoid undue discrimination, giving, if reasonable under all the circumstances, to each pool with wells of small settled production an allowable production which will prevent a general premature abandonment of the wells in the pool.*

(b) In fixing allowables for pools producing condensate as defined in subsection (f) of Section 1 of this

* See Appendix A as an example of a standard for allocation among pools.

Act, the Commission shall take into account the producing conditions and other facts in such pools, and in connection with the operations therein, the needs for oil, gas, and condensate, and the Commission shall fix the allowable for gas or condensate or both for each such pool so that undue discrimination will not result.

Appendix A:

The Kansas statute which prescribes a standard for the allocation among pools according to potentials as modified by acreage contains the following provision:

" * * * in making such allocation among the pools in the state the Commission shall take into consideration among other proper factors, and give due and proper weight to the following: (d) the prevention of waste in any pool; (e) the quantity of oil that will be produced from nonprorated pools; (f) the ratio of the daily productive capacity of each prorated pool to the total daily productive capacity of all prorated pools in the state, after the Commission shall have adjusted the said respective daily productive capacities of such pools by such method as the Commission may find necessary so that the ratio when so adjusted and applied will result approximately in a fair and equitable allocation of the production among such pools, and as a basis for such adjustment of ratio, the Commission shall make a classification of the prorated pools on the basis of the daily average productive capacities of the wells in such pools respectively, giving due consideration to the acreage reasonably attributable to each well, so that the respective pool classifications, in their order from the smallest to the largest, will be allocated a daily rate of production in percentages on a descending scale, but so as to result in a progressively increasing average daily allowed production in barrels per well from the smallest to the largest pool classification; Provided, however, such reasonable adjustments may be made with respect to any pool or pools as the Commission may find to be necessary under the practical circumstances; (g) the availability of pipe lines and other means of transportation; (h) the reasonable ability of each purchaser to satisfy his or its desire for oil produced in this state without concentrating purchases in any selected pool or pools, and the availability of oil to the various purchasers by exchange with or purchase from other purchasers of oil produced in this State; all to the end that so far as possible no producer or group of producers and no purchaser or group of purchasers shall have or be given any special favor or privilege, that the development and conservation of the oil resources of this State may be encouraged, and that the general welfare and prosperity of oil producers, royalty owners, and the general public in this State may be promoted. Such determination and allocation shall be made from time to time as circumstances may require."

(It seems that the Corporation Commission of Kansas has been able to administer this provision rather satisfactorily under conditions which exist in Kansas.)

(c) In allocating allowables to pools, the Commission shall not be bound by nominations or desires of purchasers to purchase oil from particular fields or areas, and the Commission shall allocate the State allowable among the pools in such manner as will prevent undue discrimination against some pools or areas as a result of selective buying by purchasers of oil, as such term "selective buying" is understood in the oil business.

(d) The Commission shall promulgate rules setting forth standards for the distribution of the allowable of oil for the State among the pools therein to accomplish the ends declared in subsections (a) and (b) of this Section, and shall distribute the allowable for the State among the pools in accordance with such standards, and, where conditions in one pool or area are substantially similar to those in another pool or area, then the same standards shall be applied to such pools or areas so that as far as practicable a uniform program will be followed.

(e) Whenever the Commission limits the total amount of oil or gas which may be produced in any pool in this State to an amount less than that which the pool could produce if no restrictions were imposed (which limitation may be imposed either incidental to, or without, a limitation of the total amount of oil or gas which may be produced in the State), the Commission shall prorate or distribute the allowable production among the producers in the pool on a reasonable basis, and so that each producer will have the opportunity to produce or receive his just and equitable share, as such share is set forth in Section 7 of this Act, subject to the reasonable necessities for the prevention of waste.

(f) Whenever the total amount of gas which can be produced from any pool in this State exceeds the amount of gas reasonably required to meet the reasonable market demand therefrom, the Commission shall limit the total amount of gas which may be produced from such pool. The Commission shall then allocate or distribute the allowable production among the developed areas in the pool on a reasonable basis, so that each producer will have the opportunity to produce his just and equitable share, as such share is set forth in Section 7 of this Act, whether the restriction for the pool as a whole is accomplished by order or by the automatic operation of the prohibitory provisions of this Act.

(g) After the effective date of any rule, regulation, or order of the Commission fixing the allowable production of oil or gas, or both, no person shall produce from any well, lease, or property more than the allowable production which is fixed, nor shall such amount be produced in a different manner than that which may be authorized.

Section 11. (a) The Commission is hereby empowered to issue subpoena for witnesses, to require their attendance and the giving of testimony before it, and to require the production of books, papers, and records in any proceeding before the Commission as may be material upon the questions lawfully before it. Such subpoenas shall be served by the sheriff, or any agent of the Conservation Department, or any other officer authorized by law to serve process in this State. No person shall be excused from attending and testifying, or from producing books, papers, and records before the Commission or a court, or from obedience to the subpoena of the said Commission or a court, on the ground or for the reason that the testimony or evidence, documentary or otherwise, required of him may tend to incriminate him or subject him to a penalty or forfeiture; provided, that nothing herein contained shall be construed as requiring any person to produce any books, papers, or records, or to testify in response to any inquiry not pertinent to some question lawfully before such Commission or court for determination. No natural person shall be subjected to criminal prosecution or to any penalty or forfeiture for or on account of any transaction, matter or thing concerning which he may be required to testify or produce evidence, documentary or otherwise, before the Commission or court, or in obedience to its subpoena; provided, that no person testifying shall be exempted from prosecution and punishment for perjury committed in so testifying.

(b) In case of failure or refusal on the part of any person to comply with any subpoena issued by said Commission, or in case of the refusal of any witness to testify or answer as to any matter regarding which he may be lawfully interrogated, any district court in this state, on application of said Commission, may in term time, or vacation, issue an attachment for such person and compel him to comply with such subpoena and to attend before the Commission and produce such documents, and give his testimony upon such matters as may be lawfully required, and such court shall have the power to punish for contempt as in case of disobedience of like subpoena issued by or from such court, or for refusal to testify therein.

If it is desired that judicial review shall be on the record made before the Commission, Section 12 could read as follows:

Section 12. (a) All rules, regulations, and orders prescribed by the Commission shall be prima facie reasonable and valid unless or until changed or modified by the Commission or pursuant to proceedings instituted in a court of competent jurisdiction, as provided in this Act.

(b) Any interested person adversely affected by the provisions of this Act or by any rule, regulation, or order made by the Commission hereunder may, within ten (10) days from the date of the service of such order or decision, apply for a rehearing with respect to any matter determined therein; the application shall be granted or denied by the Commission in whole or in part within ten (10) days from the date same shall be filed, and if a rehearing be not granted within ten (10) days it shall be taken as denied.

If the applicants for rehearing shall desire to submit any additional evidence, the Commission shall set a time and place for the reception thereof and shall proceed to hear and consider same. Should an appeal be taken from the rule, regulation, or order finally entered, the evidence so received shall be incorporated with and constitute a part of the record on appeal to the same extent as though it had been introduced at the original hearing.

If a rehearing be granted, the matter shall be determined by the Commission within thirty (30) days after same shall be finally submitted for determination. No cause of action arising out of any order or decision of the Commission shall accrue in any court to any party unless such party shall make application for a rehearing as herein provided. Such application shall set forth specifically the ground or grounds on which the applicant considers such statute, order, or decision to be unlawful or unreasonable. No party shall, in any court, urge or rely upon any ground not set forth in said application. Any order made after a rehearing, changing or modifving the original order or decision, shall have the same force and effect as an original order or decision.

(c) Within thirty (30) days after the application for a rehearing is denied, or, if the application is granted, then within thirty (30) days after the rendition of the decision on rehearing, the applicant may apply to the District Court of _____ County for a review of such rule, regulation, order, or decision. The application for review shall be filed in the office of the Clerk of the District Court of said county and shall specifically state the grounds for review upon which the applicant relies and shall designate the statute, rule, regula-

tion, order, or decision sought to be reviewed. The Clerk of the District Court shall immediately serve a certified copy of said application upon the Commission by transmitting a certified copy thereof by registered mail to the Secretary of the Commission at his office.

(d) The Secretary of the Commission, upon receipt of such copy of application for review, shall forthwith transmit to the Clerk of the District Court in which said proceeding is pending a certified transcript of all pleadings, applications, orders, or decisions of the Commission and of the evidence heard by the Commission with respect thereto; provided, that the parties, with the consent and approval of the Commission, may stipulate in writing that only certain portions of the record be transcribed.

(e) Such proceedings for review shall be in the nature of an appeal and shall be for the purpose of having the lawfulness and reasonableness of the original rule, regulation, order, or decision, or the order or decision on rehearing, or the validity of this Act, inquired into and determined. **The district court hearing such cause shall have the power to vacate or set aside such order or decision only on the ground that such order or decision is unlawful or unreasonable. Findings of fact made by the Commission in support of the rule, regulation, or order complained of shall be upheld by the court if supported by substantial evidence, ordinarily admissible under accepted legal principles and rules of evidence.**

(f) After the transcript has been filed in the office of the Clerk of the District Court in which the application for review was filed, the Judge of such District Court may, on his own motion, or on application of any of the parties to the proceeding, whether interveners or original parties, make an order fixing the time for the filing of abstracts and briefs and fixing a day for the hearing of such cause. All proceedings under this Section shall have precedence in any court in which they may be pending, and the hearing of the cause shall be by the court without the intervention of a jury. The procedure upon the trial of such proceedings in the District Court and upon appeal to the Supreme Court of this State shall be the same as in other civil actions, except as herein provided. **No court of this State shall have power to set aside, modify, or vacate any order or decision of the Commission, whether the action by which the rule, regulation, or order is challenged be one in equity or at law, except as herein provided.**

(g) **No new or additional evidence may be introduced upon the trial or in any proceedings for review under the provisions of this Act; but the cause shall be heard upon the questions of fact and law presented by the evidence and exhibits introduced before the Commission and certified by it;** Provided, that, if it shall be shown to the satisfaction of the court that any party to the said proceeding who is adversely affected by such rule, regulation, or order, has additional material evidence which could not, by the exercise of due diligence, have been produced at the hearing before the Commission, or which for some good reason it was prevented from producing at such hearing; or if, upon the trial of the proceeding the court shall find that the Commission erroneously refused to admit or consider material evidence proffered by any party at the hearing before the Commission, the court may in its discretion stay the proceeding and make an order directing the Commission to hear and consider such evidence. In such cases it shall be the duty of the Commission immediately to hear and consider such evidence and make an order modifying, setting aside, or affirming its former decision. The Commission, after hearing and considering such additional evidence, shall vacate, modify, or affirm its decision, and a transcript of the additional evidence and the order or decision of the Commission shall be certified and forwarded to the Clerk of the District Court in which such proceeding is pending; and the District Court, on motion of any interested party, shall order the trial to proceed upon the transcript as supplemented so as to enable the court to properly determine if the order or decision of the Commission as originally made or as modified is unlawful or unreasonable.

(h) The filing or pendency of the application for review provided for in this Act, or the granting of a rehearing, shall not in itself stay or suspend the operation of any order or decision of the Commission, but during the pendency of such proceeding for review the court, in its discretion, may stay or suspend, in whole or in part, the operation of the order or decision of the Commission. No order so staying or suspending an order or decision of the Commission shall be made by any court of this state otherwise than on five (5) days' notice and after a hearing; and if a stay or suspension is allowed, the order granting same shall contain a specific finding, based upon evidence submitted to the court and identified by reference thereto, that great or irreparable damage would otherwise result to the petitioner and such order shall specify the nature of the damage.

(i) In case the order or decision of the Commission is stayed or suspended, the order of the court shall not become effective until a suspension bond shall have been executed and filed with and approved by the court, payable to the clerk of the court for the use and benefit of the people of the State, and for the use and benefit of all persons who may be injured by the acts done under the protection of the decision staying or suspending such rule, regulation, or order of the Commission. Such bond shall be sufficient in amount and security to secure the prompt payment, by the party petitioning for the stay, of all damages caused by the delay in the enforcement of the order or decision of the Commission; and if the staying or suspending of such rule, regulation, or order of the Commission has the effect of permitting a developed unit or units to produce oil or gas in excess of the production quota established therefor by the provisions of such rule, regulation, or order of the Commission, then the amount of the bond shall be at least equal to the market value of the portion of the oil or gas authorized to be produced in excess of the amount established by such rule, regulation, or order of the Commission. All persons claiming injury by reason of the wrongful suspension of a rule, regulation, or order of the Commission, must bring suit within six (6) months after the date upon which it was finally determined that such rule, regulation or order of the Commission was lawful and reasonable, and such actions may proceed against the bond given in compliance with the provisions of this section.

(j) The authority of the court shall be limited to a judgment either affirming or setting aside in whole or in part the rule, regulation, order, or decision of the Commission. If the court, upon such hearing, shall find such rule, regulation, or order of the Commission under review to be lawful and reasonable, it shall render judgment sustaining such order and shall transmit to the Commission three (3) certified copies of such judgment.

(k) If the court shall find that the rule, regulation, or order of the Commission is unlawful or unreasonable in whole or in part, it shall vacate or set aside such rule, regulation, or order in whole or in part, and shall make findings of fact and conclusions of law, and upon final judgment the clerk of the court shall transmit to the Commission three (3) certified copies of the judgment of the court and the findings of fact and conclusions of law.

(l) All rules, regulations, orders, or decisions of the Commission shall become operative and effective in accordance with the provisions hereof; provided, that, pending the exhaustion of his administrative remedies, any interested person adversely affected thereby shall, upon application, be entitled to an order staying and suspending the operation thereof, during such period and until such time as said matter could be submitted to the district court on an application for a stay as provided in subsection (h) hereof; but such stay shall be contingent upon the execution and filing of a bond conforming to the requirements of subsection (i) hereof, except that same shall be approved by and filed with the Commission. After the lapse of time within which proceedings could be taken, as provided in this Act, to obtain a review of such rule, regulation, order, or decision, if no such proceedings have been initiated, such rule, regulation, order, or decision and the findings of fact made by the Commission thereon shall be held to be conclusive as to the matters involved therein in any suit to enforce such rule, regulation, order, or decision or in any collateral suit or proceeding.

However, the failure to commence such proceedings for review within said 30-day period shall not deprive any interested party of the right to initiate a proceeding before the Commission, pursuant to the provision of Section 6-F hereof; to change, modify, amend or revoke a rule, regulation, order or decision then in effect but the scope of said proceeding shall in no wise be retroactive and any rule, regulation or order thereafter issued shall be only prospective in nature.

(m) Promptly after the final determination of the validity, in whole or in part, of the rule, regulation, or order complained of, the Commission shall call a hearing for the purpose of determining what regulation should be made with respect to the wells and properties of the person securing the stay in order to offset any advantage obtained as a result of such stay, and the Commission is specifically authorized to shut in or reduce the allowable of such wells for such period as may be necessary to offset any production obtained while the

stay was in force which is in excess of the allowable which was applicable to such wells and properties. With respect to suits based on the bond provided for in this Section, the court shall take into account the action of the Commission, as authorized by this subsection, in determining liability, if any, under the bond.

If it is desired that judicial review shall be by a trial de novo, Section 12 could read as follows:

Section 12. (a) Any interested person adversely affected by any statute of this State with respect to conservation of oil or gas or both, or by any provisions of this Act, or by any rule, regulation, or order made by the Commission hereunder, or by any act done or threatened thereunder, and who has exhausted his administrative remedy, may obtain court review and seek relief by a suit for an injunction against the Commission and its members as defendants, which suit shall be instituted in the district court of ———— County. Such suit shall be tried de novo as an ordinary civil suit. The attorney representing the Commission may have any such case set for trial at any time aften ten (10) days' notice to the plaintiff or his attorney of record. In such trial, unless otherwise provided for herein, the burden of proof shall be upon the plaintiff, and all pertinent evidence with respect to the validity and reasonableness of the rule, regulation, or order of the Commission complained of shall be admissible. The statute, provision of this Act, or the rule, regulation, or order complained of, shall be taken as prima facie valid, unless otherwise provided for herein; however, the findings of fact made by the Commission in support of the rule, regulation, or order complained of shall not be conclusive on the court though supported by evidence at the hearings before the Commission. With respect to findings of fact made by the Commission clearly relating to prevention of waste, and which do not primarily control or affect the allocation of the pool allowable among the producers therein, a finding shall be upheld if there be substantial evidence introduced at the trial in support of such finding; and in determining whether there be substantial evidence, the court shall consider all the evidence and shall pass on the credibility of witnesses; nevertheless, with respect to findings of fact, actual or presumed, which relate primarily or wholly to the distribution of allowable production among the producers in a pool, the court, as in an ordinary civil suit, shall resolve such fact issues as may be necessary for a decision as to the reasonableness and validity of the distribution of the allowable production as to the person complaining thereof in such suit, not being bound by actual or presumed findings by the Commission with respect to such facts, though supported by substantial evidence introduced at the trial.

(b) No temporary restraining order or temporary injunction of any kind shall be granted against the Commission and its members or against the Attorney General, or against any agent, employe, or representative of the Commission, restraining the Commission and its members, or any of its agents, employes, or representatives, or the Attorney General, from enforcing any statute of this State relating to conservation of oil and gas, or any of the provisions of this Act, or any rule, regulation, or order made thereunder, except after due notice to the Commission, and to all other defendants, and after a hearing at which it shall be shown to the court by evidence other than merely by affidavits, that the act done or threatened is probably without sanction of law, or that the provisions of this Act, or the rule, regulation, or order complained of, is probably invalid or unreasonable, and that, if enforced against the complaining party, will probably cause an irreparable injury. With respect to any order or decree granting temporary injunctive relief, the nature and extent of the probable invalidity of the statute, or of any provision of this Act, or of a rule, regulation, or order thereunder involved in such suit, must be recited in the order or decree granting the temporary relief, as well as a clear statement of the probable damage relied upon by the court as justifying temporary injunctive relief.

(c) No temporary injunction of any kind against the Commission and its members, or its agents, employes, or representatives, or the Attorney General, shall become effective until the plaintiff shall execute a bond in such amount and upon such conditions as the court may direct. The bond shall be made payable to the clerk of the court, shall be approved by the Judge of the court, and shall be for the use and benefit of all persons who may be injured by the acts done under the protection of the injunction. All persons claiming injury must bring suit within six (6) months after the date of the final determination of the validity, in whole or in part, of the rule, regulation, or order, the enforcement of which was enjoined.

(d) Promptly after the final determination of the validity, in whole or in part, of the rule, regulation, or order complained of, the Commission shall call a hearing for the purpose of determining what regulation should be made with respect to the wells and properties of the person securing the injunction in order to offset any advantage obtained as a result of such injunction, and the Commission is specifically authorized to shut in or reduce the allowable of such wells for such period as may be necessary to offset any production obtained while the injunction was in force which is in excess of the allowable which was applicable to such wells and properties. With respect to suits based on the bond provided for in this Section, the court shall take into account the action of the Commission, as authorized by this subsection, in determining liability, if any, under the bond.

(In states such as Oklahoma, where the Commission is a constitutional body possessing legislative, executive, and judicial powers, procedural provisions should be drafted in conformity therewith.)

Section 13. Whenever it shall appear that any person is violating or threatening to violate any statute of this State with respect to the conservation of oil or gas, or both, or any provision of this Act, or any rule, regulation, or order made by the Commission thereunder, the Commission shall bring suit in the name of the Commission against such person in the District Court in the county of the residence of the defendant, or in the county of the residence of any defendant if there be more than one defendant, or in the county where the violation is alleged to have occurred or is threatened, to restrain such person from continuing such violation or from carrying out the threat of violation. In such suit the Commission may without bond obtain injunctions, prohibitory and mandatory, including temporary restraining orders and preliminary injunctions, as the facts may warrant, including, when appropriate, an injunction restraining any person from moving or disposing of any illegal oil, illegal gas, or illegal product, and any or all such commodities may be ordered to be impounded or placed under the control of any agent appointed by the court, if, in the judgment of the court, such action is advisable.

Section 14. In all proceedings brought under authority of this Act, or of any oil or gas conservation statute of this State, or of any rule, regulation, or order issued thereunder, and in all proceedings instituted for the purpose of contesting the validity of any provision of this Act or of any oil or gas conservation statute, or of any rule, regulation, or order issued thereunder, appeals may be taken in accordance with the general laws of the State relating to appeals; provided, however, that in all appeals from judgments or decrees in suits to contest the validity of any provision of this Act, or any rule, or regulation of the Commission hereunder, such appeals when docketed in the proper appellate court shall be placed on the preference docket of such court and may be advanced as such court may order and direct.

Section 15. In the event the Commission should fail to bring suit within ten (10) days to enjoin any actual or threatened violation of any statute of this State with respect to the conservation of oil and gas, or of any provision of this Act, or of any rule, regulation, or order made thereunder, then any person or party in interest adversely affected by such violation, and who has notified the Commission in writing of such violation, or threat thereof, and has requested the Commission to sue, may, to prevent any or further violation, bring suit for that purpose in the District Court of any county where the Commission could have instituted such suit. If, in such suit, the court should hold that injunctive relief should be granted, then the Commission shall be made a party and shall be substituted for the person who brought the suit, and the injunction shall be issued as if the Commission had at all times been the complainant party.

Section 16. Any person who, for the purpose of evading this Act, or of evading any rule, regulation, or order made thereunder, shall intentionally make or cause to be made any false entry or statement of fact in any report required to be made by this Act or by any rule, regulation, or order made hereunder, or who, for such purpose, shall make or cause to be made any false entry in any account, record, or memorandum kept by any person in connection with the provisions of this Act or of any rule, regulation, or order made thereunder; or any person who, for such purpose, shall omit to make, or cause to be omitted, full, true, and correct entries in such accounts, records, or memoranda, of all facts and transactions pertaining to the interest or activities in the petroleum industry of such person

as may be required by the Commission under authority given in this Act or by any rule, regulation, or order made thereunder, or who, for such purpose, shall remove out of the jurisdiction of the State or who shall destroy or mutilate, alter, or by any other means falsify, any book, record, or other paper, pertaining to the transactions regulated by this Act or by any rule, regulation, or order made thereunder shall be deemed guilty of a misdemeanor and shall be subject, upon conviction in any court of competent jurisdiction, to a fine of not more than Five Thousand Dollars ($5,000.00), or imprisonment for a term of not more than six (6) months, or to both such fine and imprisonment.

Section 17. (a) Any person who knowingly and wilfully violates any provision of this Act, or any rule, regulation, or order of the Commission made hereunder, shall, in the event a penalty for such violation is not otherwise provided for herein, be subject to a penalty of not to exceed One Thousand Dollars ($1,000.00) a day for each and every day of such violation, and for each and every act of violation, such penalty to be recovered in a suit in the District Court of the county where the defendant resides, or in the county of the residence of any defendant if there be more than one defendant, or in the District Court of the county where the violation took place. The place of suit shall be selected by the Commission, and such suit, by direction of the Commission, shall be instituted and conducted in the name of the Commission. The payment of any penalty as provided for herein shall not have the effect of changing illegal oil into legal oil, illegal gas into legal gas, or illegal product into legal product, nor shall such payment have the effect of authorizing the sale or purchase or acquisition, or the transportation, refining, processing, or handling in any other way, of such illegal oil, illegal gas, or illegal product, but, to the contrary, penalty shall be imposed for each prohibited transaction relating to such illegal oil, illegal gas, or illegal product. The payment of any penalty shall not impair or abridge any cause of action which any person may have against the person violating a rule, regulation, or order by reason of an injury resulting from such violation.

(b) Any person knowingly and wilfully aiding or abetting any other person in the violation of any statute of this State relating to the conservation of oil or gas, or the violation of any provision of this Act, or any rule, regulation, or order made thereunder, shall be subject to the same penalties as are prescribed herein for the violation by such other person.

Section 18. (a) The sale, purchase, or acquisition, or the transportation, refining, processing, or handling in any other way, of illegal oil, illegal gas, or illegal product is hereby prohibited.

(b) Unless and until the Commission provides for certificates of clearance or tenders, or some other method, so that any person may have an opportunity to determine whether any contemplated transaction or sale, purchase, or acquisition, or of transportation, refining, processing, or handling in any other way, involves illegal oil, illegal gas, or illegal product, no penalty shall be imposed for the sale, purchase, or acquisition, or the transportation, refining, processing, or handling in any other way, of illegal oil, illegal gas, or illegal product, except under circumstances hereinafter stated. Penalties shall be imposed for the commission of each transaction prohibited in this Section when the person committing the same knows that illegal oil, illegal gas, or illegal product is involved in such transaction, or when such person could have known or determined such fact by the exercise of reasonable diligence or from facts within his knowledge. However, regardless of lack of actual notice or knowledge, penalties as provided in this Act shall apply to any purchase, sale, or acquisition, and to the transportation, refining, processing, or handling in any other way, of illegal oil, illegal gas, or illegal product, where administrative provision is made for identifying the character of the commodity as to its legality. It likewise shall be a violation for which penalties shall be imposed for any person to sell, purchase, or acquire, or to transport, refine, process, or handle in any other way, any oil, gas, or any product without complying with all applicable rules, regulations, or orders of the Commission relating thereto.

Section 19. (e) Apart from, and in addition to, any other remedy or procedure which may be available to the Commission, or any penalty which may be sought against or imposed upon any person with respect to violations relating to illegal oil, illegal gas, or illegal product, all illegal oil, illegal gas, and illegal products shall, except under such circumstances as are stated herein, be contraband and shall be seized and sold, and the proceeds applied as herein provided. Such sale shall not take place unless the court shall find, in the proceeding provided for in this paragraph, that the commodity involved is contraband. Whenever the Commission believes that illegal oil, illegal gas, or illegal product is subject to seizure and sale, as provided for herein, it shall, through its attorney, bring a civil action in rem for that purpose in the District Court of ———— County, or of the county where the commodity is found, or the action may be maintained in connection with any suit for injunction or for penalty relating to any prohibited transaction involving such illegal oil, illegal gas, or illegal product. Any person or party in interest who may show himself to be adversely affected by any such seizure and sale shall have the right to intervene in such suit to protect his rights.

(b) The action referred to above shall be strictly in rem and shall proceed in the name of the State as plaintiff against the illegal oil, illegal gas, or illegal product described in the petition as defendant, and no bond or bonds shall be required of the plaintiff in connection therewith. Upon the filing of the petition, the clerk of the court shall issue a citation with a copy of the petition attached thereto, directed to the sheriff of the county, or to such other officer or person as the court may authorize to serve process, requiring him to cite any and all persons (without undertaking to name them) who may be interested in the illegal oil, illegal gas, or illegal product described in the petition to appear and answer on a day certain, not to be less than fifteen (15) days after the issuance of such petition and citation. Service of the citation shall be made at least ten (10) days before the appearance day stated in the citation, and shall be made by posting a copy of the petition and citation upon the courthouse door or on any bulletin board within the court house provided for the posting of notices, of the county where the commodity involved in the suit is alleged to be located and by posting another copy thereof near the place where the commodity is alleged to be located. The posting of such petition and citation shall constitute not only notice of the action, but also constructive possession of such commodity by the State. Proof of service of citation, and the manner thereof, shall be made as required by law as to service of an ordinary citation in a civil suit.

(c) Where it appears by a verified pleading on the part of the plaintiff, or by affidavit or affidavits, or by oral testimony, that grounds for the seizure and sale exist, the court shall issue an order of seizure. Such order of seizure shall specifically describe the illegal oil, illegal gas, or illegal product, so that the same may be identified with reasonable certainty. It shall direct the sheriff to whom it is addressed to take into his custody, actual or constructive, the illegal oil, illegal gas, or illegal product described therein, and to hold the same subject to the orders of the court. The sheriff shall be responsible upon his official bond for the proper execution thereof.

(d) In a proper case, the court may direct the sheriff to deliver the custody of any illegal oil, illegal gas, or illegal product seized by him under an order of seizure, to a conservator appointed by the court, which conservator shall act as the agent of the court and shall give bond with such approved surety as the court may direct, conditioned that he will faithfully conserve such illegal oil, illegal gas, or illegal product, as may come into his custody and possession in accordance with the orders of the court; provided, that the court may in its discretion appoint any agent of the Commission as such conservator.

(e) The producer, owner, or any other party contesting the validity of any such seizure, and having an interest in securing the release of the seized oil, gas, or other product, may obtain the release thereof upon furnishing a bond issued by a corporate surety company duly qualified to do business in the State in an amount exceeding by one-half the current market value of the oil, gas, or other product held under seizure, which bond shall be in favor of the sheriff and shall be conditioned upon, and shall remain in full force and effect until, final determination of the validity of such seizure.

(f) Sales of illegal oil, illegal gas, or illegal product, made under the authority of this Act, and notices of such sales, shall be in accordance with the laws of this State relating to the sale and disposition of personal property seized under a writ of execution, subject to any contrary provisions of this Act.

(g) The court may order that the commodity be sold in specified lots or portions, and at specified intervals, instead of being sold at one time. Title to the amount sold shall pass as of the date of the act which is found by the court to make the commodity contraband. The amount sold shall be treated as legal oil, legal gas, or legal product, as the case may be, in the hands of the purchaser, but the purchaser and the commodity shall be subject to all applicable laws, and rules, regulations, and orders with respect to further sale or

purchase or acquisition, and with respect to the transportation, refining, processing, or handling in any other way, of the commodity purchased.

(h) The proceeds of the sale of any such illegal oil, illegal gas, or illegal product shall be applied first to the payment of the costs of the action and the expenses incident to the sale of such illegal oil, illegal gas, or illegal product, after such expenses have been approved and allowed by the court trying the case, and all funds then remaining shall be paid to ————.

Section 20. If any part or parts of this Act, or the application thereof to any person or circumstances, be held to be unconstitutional, such invalidity shall not affect the validity of the remaining portions of this Act, or the application thereof to other persons or circumstances. The Legislature hereby declares that it would have passed the remaining parts of this Act if it had known that such part or parts thereof would be declared unconstitutional.

Section 21. Although certain portions of this Act are designated as sections or subsections or paragraphs, such section, subsection, or paragraph is here designated as a section of this Act as contemplated by Article ——— of the Constitution.

Section 22. Repealing clause.

Section 23. Saving clause.

Compact Suggests

[*Continued from page 39*]

productive, then the allowable assigned to the well shall be based on the productive portions of the unit alone

The bill, for the first time attempts to define the "just and equitable share of oil or gas in a pool," which is owned by each operator. This was defined as that part of the authorized production for the pool which is substantially in the proportion that the quantity of recoverable oil and gas in the developed area of his tract or tracts in the pool bears to the recoverable oil and gas in the total developed area of the pool, insofar as these amounts can be practically ascertained; and to that end, the rules, regulations, and orders of the commission shall be such as will prevent or minimize reasonably avoidable net drainage from each developed area (that is, drainage which is not equalized by counter drainage), and will give to each producer the opportunity to use his just and equitable share of the reservoir energy.

The commission would be given powers to require the drilling, casing and plugging of wells in a proper manner and "to require reasonable bond with good and sufficient surety conditioned for the performance of the duty to plug each dry or abandoned well."

In addition to being able to require the logs of wells drilled for oil or gas, the commission would be empowered to obtain logs for wells drilled for "geological information, or key wells for secondary recovery projects, or wells for the disposal of salt water, brine, or other oil field waste."

Burning gas for carbon black or chemicals is declared to constitute waste prima facie, unless it is clearly shown that the gas cannot be used for light and fuel, and that it would be in the public interest to grant a permit for carbon-black production.

Pipe Lines

Federal Body Orders Oil Pipe Line Rate Reduction

Climaxing a six-year investigation, the Interstate Commerce Commission last week ordered 21 oil pipe line companies to show cause within 60 days why their charges should not be reduced in amounts ranging from 3.75 to 55.01 percent. The commission also ruled that tenders of more than 10,000 barrels were not reasonable.

Earnings of the carriers would be restricted to 8 percent of their valuation, as fixed by the valuation division of the commission. The ruling, to which two members of the commission dissented, will not be enforced before further hearings expected to be asked by the companies are held.

"We would doubtless be justified to issue final orders on the basis of the present record," the commission said. "We do not believe it would be desirable to do so without giving the respondents a further opportunity to develop any facts which should receive consideration before we make an order for the future."

Twenty-one of 35 respondent companies in the case were found by the commission to be earning in excess of 8 percent on valuation. The record showed no general rule on the minimum tender, but that a majority of the companies require tenders ranging from 50,000 to 100,000 barrels.

The commission said that pipe line rates have been reduced materially since the investigation began, but that in some cases they remained too high and that legal action against the companies was necessary. The following companies showed earnings in excess of 8 percent, the commission said:

Standish Pipe Line Company, 9.72 percent; Gulf Pipe Line Company of Oklahoma, 10.74; Pan-American Pipe Line Company, 11.02; Oklahoma Pipe Line Company, 11.17; Sinclair Prairie Pipe Line Company, 11.30; Tuscarora Oil Company, 11.74; Humble Pipe Line Company, 12.59; Texas Pipe Line Company, 13.84; Shell Pipe Line Company, 16.41; Stanolind Pipe Line Company, 17.53; Imperial Pipe Line Company, 18.11; Atlantic Pipe Line Company, 19.69; Texas Pipe Line Company of Oklahoma, 20.19; Sinclair Prairie Pipe Line Company of Texas, 21.46; Ajax Pipe Line Company, 23.05; Gulf Pipe Line Company of Pennsylvania, 23.94; International Pipe Line Company, 29.77; Arkansas Pipe Line Company, 31.77; Tidal Pipe Line Company, 32.93; Texas Empire Pipe Line Company, 37.53, and Pure Transportation Company, 46.86.

The 14 companies found by the commission to be earning less than 8 percent on their valuations are:

Montana Pipe Line Company, Eureka Pipe Line Company, Northern Pipe Line Company, Buckeye Pipe Line Company, Continental Pipe Line Company, South West Pennsylvania Pipe Lines, Indiana Pipe Line Company, Standard Pipe Line Company, National Transit Company, Gulf Pipe Line Company, New York Transit Company, Empire Pipe Line Company, Tidewater Pipe Line Company, and Illinois Pipe Line Company.

"The hazards and uncertain future of the common carrier business of the pipe lines suggest the fairness of a somewhat larger rate of return than it would be reasonable to expect would be applied to industries of a more stable character, where the volume of traffic is more accurately predictable," the commission said.

In a dissenting opinion in which he was joined by Commissioner Patterson, Commissioner Mahaffie declared the majority opinion presented an entirely new theory of rate regulation in a competitive field.

"The majority concludes," said Mahaffie, "that the annual earnings of a pipe line company should not exceed 8 percent of our valuation of its property. Earnings greater than 8 percent are held to show that the rates of such a company are excessive. This seems to me to unduly simplify the question."

Mahaffie cited the different rates which would be charged by four large companies for identical service from the Mid-Continent field to Chicago if the plan advocated by the majority is adopted. The companies are the Shell Pipe Line, Sinclair Refining, Stanolind Pipe Line and Texas-Empire Pipe Line.

At present, their rates from the field to Chicago are identical. Under the plan proposed, instead of rates of 38.5 cents, the four companies respectively would be forced to publish rates for this service as follows, 33.5 cents, 30.5 cents, 29.5 cents and 17.5 cents.

"Unless the first three companies met the 17.5 cent rate, the business of the Texas-Empire company undoubtedly would have increased to such an extent as to require a further reduction," Mahaffie declared.

Associations

Mid-Continent Group Holds Defense Meet January 11

The petroleum industry in the national defense is the theme of the annual membership dinner of the Kansas-Oklahoma division of the Mid-Continent Oil & Gas Association, to be held at Tulsa, January 11. Henry R. Luce, editor of Time, will be the principal speaker.

An information-type discussion will be held with William P. Steen, managing editor of the Tulsa Tribune, as moderator, and a panel consisting of George A. Hill, president of Houston Oil Company of Texas, Houston; Dr. Gustav Egloff, Universal Oil Products Company, Chicago; Baird H. Markham, New York, and Chester H. Gray, Washington.

Competition Underway for Lucas Gusher Monument

The Lucas Gusher Monument Association will receive plans for construction of a monument commemorating the Lucas gusher at Spindletop, Jefferson County, Texas, at 2 p.m. January 10 at the Hotel Beaumont, Beaumont, Texas. The date marks the fortieth anniversary of bringing in the well.

Cost of the completed monument shall not exceed $9,000, and proposals are to be accompanied by outline specifications covering materials, methods of construction, fabrication, erection. The successful bidder will be required to furnish, at a later date, detail drawings and specifications for approval of the association and its architects and engineers. Proposals are to be accompanied by a model fabricated to the scale of ½-inch to 1-foot.

Fuel Oils in Good Demand; Crude Prices Are Revised

The industry's markets have been quiet and largely unchanged in the protracted holiday period, no important revisions having been made in prices of refined products, although crude prices have been revised locally.

Effective January 2, crude postings were advanced 10 cents a barrel throughout all central Michigan fields. No changes were posted immediately by purchasers of crude from the shallow fields on the west side of the state, which account for about 16,000 barrels of the state's total daily output of 41,500 barrels.

The 10-cent increase, first since August of last year, was attributed to the decline of Michigan production in the face of a strong market demand by refineries. Two pipe-line companies had sent notices a week before that run commitments would be reduced from 10 to 25 percent January 1. Also having a bearing on the Michigan market is the present activity aimed at bringing in around 4500 barrels daily of Illinois crude into the central Michigan refining area.

Bay Refining Company posted a price of $1.48 a barrel for high-gravity distillate produced from Gulf Oil Corporation's deep well at Bay City, an 8-cent advance. Other prices were advanced 10 cents straight. New prices for leading areas are: Temple and Sherman, $1.17; Porter, Wise, Jasper and Greendale, $1.22; Buckeye, $1.20; Clayton and West Branch, $1.02; and Adams-Arenac, $1.05.

High-gravity South Texas crudes again showed extreme weakness when Barnsdall Oil Company, effective January 1, reduced its prices for those oils 2 to 24 cents a barrel, the action affecting about 10,000 barrels daily of purchases in the Refugio and Corpus Christi areas. Crudes up to 28-28.9 gravity were left unchanged in price, but under the new schedule, all oils above that grade take the same price as 28-gravity crude, whereas the old schedules called for a 2-cent spread between degrees of gravity up to the top classification of 40-gravity and above. Under the new schedules, the top price for Fagan, McFaddin and Greta crudes is $1.09 a barrel for 28-gravity and above whereas the former top was $1.33 for 40-gravity and above. Similarly, the new top price for Victoria, East Placedo, Keeran, Placedo, and Heyser crudes is $1.04 for 28-gravity and above, as against a former top of $1.28. The schedule for the Greta-type crude ranges down by 2-cent differentials to 93 cents a barrel for 20-20.9 gravity oil, and the Placedo-Heyser type crudes range down by 2-cent differentials to 88 cents for 20-20.9-gravity. Other purchasers meanwhile continued to maintain the old schedules, which Barnsdall Oil Company abandoned.

Markets for fuel oils continued strong last week, as demand was brisk, while supplies were limited. Kerosene, range oil, and heating oil were actively sought by some refiners as well as jobbers, and the plant owners found difficulty in obtaining supplies to augment their own production. Heavy fuel oils also were in large demand, as the nation's brisk industrial activity proceeded.

Standard Oil Company (Indiana) announced January 2 that effective January 6 it would advance to normal all tank wagon prices of kerosene that were only ½-cent or less subnormal, and that other prices would be increased at least ½-cent a gallon, leaving none more than 1-cent subnormal. The company at the same time was due to advance all remaining subnormal prices of heating oils, or range oil to normal. The changes affect sales in Michigan, Illinois, Indiana, Missouri, Kansas, Iowa, Minnesota, Wisconsin and the Dakotas.

Sohio Corporation, effective January 1, increased its posting for Birk City, Kentucky, crude 5 cents a barrel, the new price being $1.10.

Out of Washington last week came the assertion by the National Defense Commission that recent fuel oil price increases resulted from large demand for heating homes and office buildings, and not from the defense program. And the commission declared that further increases in the prices were not justified. The agency had received a report from its consumers' representative which embodied the claim that higher prices of fuel oils were not justifiable on the grounds that tanker rates had increased, inasmuch as costs of operating tankers had not risen; although boat men questioned the report's claim that tanker facilities were adequate to take care of existing demands.

Tanker rates last week were steady at the established high levels, although activity was small in the open charter market. Rates last paid for clean tonnage included 70 cents for gasoline, 75 cents for kerosene, and 80 cents for No. 2 fuel oil. Dirty boats last brought 59 cents for 30-gravity or lighter crude and 66 cents for 10-20-gravity fuel oil.

No important changes were made in the past 10 days in prices of gasoline in any of the refining districts. But the addition of nearly 1,500,000 barrels to storage in the week ended December 28 was an unfavorable development.

Lubricants were in somewhat better demand in the Appalachain region, and prices were steady.

Placid Oil Company (H. H. Hunt), effective January 3, increased its posted price for the Tullos-Urania field, North Louisiana, 6 cents a barrel to 95 cents. The field has daily production of about 2225 barrels. Olla and Nebo (Jena), also in LaSalle Parish, were not affected.

Extra Shutdown Day Holds Crude Production Down

United States crude oil production remained exceptionally low in the week ended January 4, as Texas fields again were shut down three days, as in the previous week, instead of the usual two. The na-

Trends of Operations and Changes in Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

WEEK ENDED	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stocks (Barrels)	Gasoline Stocks (Barrels)	FUEL OIL STOCKS	
					Gas Oil & Dist. Fuels	Residual Fuel Oil
1938:						
November 12	3,243,250	3,180,000	273,394,000	[4]67,551,000	34,175,000	120,491,000
December 10	3,245,100	3,150,000	[6]269,509,000	68,687,000	32,068,000	118,711,000
1939:						
April 22	3,526,700	3,280,000	277,156,000	[5]87,769,000	21,085,000	105,035,000
April 29	3,568,200	3,405,000	278,440,000	86,794,000	[7]25,844,000	[7]108,409,000
May 6	3,580,900	3,275,000	[2]278,607,000	86,216,000	26,167,000	108,597,000
July 29	3,539,100	3,460,000	268,513,000	77,887,000	34,900,000	114,053,000
August 5	[1]3,909,400	3,445,000	268,982,000	76,431,000	35,601,000	114,512,000
August 26	[1]1,690,800	3,475,000	246,982,000	73,475,000	37,722,000	116,237,000
September 30	3,658,200	3,560,000	233,023,000	71,168,000	38,081,000	115,466,000
October 7	3,435,850	3,505,000	231,564,000	[6]71,152,000	38,549,000	114,397,000
October 21	3,771,550	[2]3,650,000	[3]229,127,000	72,122,000	39,358,000	115,060,000
October 28	3,498,500	3,520,000	230,453,000	72,660,000	39,562,000	114,786,000
November 25	3,818,100	3,510,000	231,811,000	75,595,000	38,527,000	112,106,000
December 30	3,545,000	3,445,000	237,742,000	80,985,000	34,184,000	106,680,000
1940:						
January 27	3,611,600	3,470,000	237,339,000	87,914,000	27,407,000	103,015,000
February 24	3,732,100	3,490,000	240,836,000	96,719,000	25,390,000	103,419,000
March 30	3,841,250	3,585,000	250,561,000	101,370,000	23,778,000	105,081,000
April 20	3,858,550	3,535,000	254,881,000	[1]102,817,000	24,779,000	103,323,000
April 27	3,845,250	3,555,000	256,670,000	102,452,000	24,997,000	102,552,000
May 25	3,835,650	3,580,000	259,330,000	100,297,000	28,356,000	104,015,000
June 22	3,846,450	[1]3,690,000	260,891,000	97,276,000	32,751,000	104,683,000
June 29	3,639,550	3,625,000	262,059,000	95,142,000	33,590,000	104,486,000
July 27	3,690,400	3,555,000	262,579,000	90,173,000	38,981,000	105,924,000
August 31	3,501,350	3,575,000	265,865,000	85,393,000	44,766,000	108,774,000
September 28	3,799,950	3,600,000	263,609,000	82,373,000	47,986,000	108,450,000
October 26	3,640,300	3,565,000	262,746,000	80,891,000	[4]48,893,000	108,475,000
December 7	3,612,600	3,460,000	261,152,000	81,062,000	44,305,000	105,353,000
December 14	3,578,950	3,495,000	261,293,000	81,234,000	43,935,000	104,105,000
December 21	3,621,200	3,585,000	262,488,000	81,870,000	42,260,000	102,841,000
December 28, 1940	3,385,500	3,585,000	.....	83,274,000	42,266,000	[8]02,620,000
December 28, 1939	3,545,000	[8]3,414,000	[4]236,038,000	82,277,000	34,122,000	106,079,000
Change in past year	—4.5%	+5.0%	+11.2%	+1.2%	+23.9%	—3.3%

[1] All time peak. [2] Peak for year. [3] Lowest since April, 1922. [4] Stocks, December 23, 1939.
[5] Lowest since October, 1922, due to shut down of six mid-Continent states. [6] Lowest for year.
[7] Prior to April 29, 1939, data did not include stocks at terminals, in transit, etc., except in California.
[8] December, 1939, daily average.

tion's output averaged 3,352,275 barrels daily. That was 22,725 barrels a day less than production in the previous week, and 207,725 barrels a day less than market demand as estimated for December by the United States Bureau of Mines.

Texas declined slightly further, having averaged 1,120,300 barrels daily, or 13,900 less than in the previous week; and for the new period the state was 156,700 barrels under market demand.

California also declined, having averaged 591,900 barrels, or 13,300 less than the week before, and 2000 barrels less than market demand. Kansas, too, showed a decrease, averaging 181,450 barrels daily, down about 5000.

Oklahoma was up about 7500 barrels to 404,625 daily, but still was 18,000 barrels under demand.

Illinois mildly rallied to 327,500 barrels from 324,250 the previous week, but failed to produce all the oil that the markets would have absorbed.

Louisiana showed a small increase, and New Mexico was unchanged.

Gasoline Accumulates While Fuel Stocks Are Maintained

Difficulties involved in turning out enough fuel oils without making too much gasoline again were demonstrated in statistics of the industry for the week ended December 28.

Withdrawals from stocks of heavy fuel oils were reduced to a compartively small amount, and there was a slight addition to light fuel oil storage, as refinery runs of crude were maintained at a compartively high level. But gasoline production was relatively large, as a result, and stocks of that product increased approximately 1,400,000 barrels. That increment was about the same as the one in the corresponding week a year ago, when the gasoline inventory was growing excessively.

Crude-oil production, meanwhile, was exceptionally low, but it reflected the erratic trend of output in Texas, which is an undesirable condition of the present proration in that state. The Texas output fluctuates widely from week to week, depending on whether there are two or three shutdown days out of the seven; although production ultimately averages out approximately in conformity with market demand.

Refinery runs in the United States averaged 3,585,000 barrels daily in the week ended December 28, the American Petroleum Institute reported, the same as in the previous week and 5 percent higher than the 3,414,000-barrel daily average of the comparable week a year ago.

Production of gasoline increased to 11,887,000 barrels for the week from 11,490,000 barrels in the preceding seven days, an expansion of nearly 400,000 barrels, without which the accumulation in storage for the week would have been held down to 1,000,000 barrels.

The gain of 1,400,000 barrels which actually occurred in gasoline stocks pushed the inventories up to 83,274,000 barrels. That amount was almost exactly a round million barrels larger than the stocks held a year previously. However, this nearness to the trend of a year ago constitutes a relatively better situation than at the beginning of 1940, as demand is greater now than at that time.

Heavy fuel oils continue in brisk demand in consequence of the high levels of industrial and commercial activity, and despite relatively large refinery output in the week ended December 28, stocks came down from 102,841,000 to 102,620,000 barrels. The latter quantity was about 3,500,000 barrels, or 3.3 percent smaller than the supply of 106,079,000 barrels held at the corresponding time a year ago.

Stocks of light fuel oils continue more satisfactory than last winter, with benefit of continued relatively mild weather, and the industry added 6,000 barrels to storage in the week of December 28. Having crept up to 42,266,000 barrels, the storage level was over 8,000,000 barrels, or 24 percent, higher than a year previously.

Crude oil stocks continue to indicate virtual balance between refinery consumption and output of the wells, having totaled 262,488,000 barrels at the end of the week of December 21. That quantity was approximately the same as that on hand at the beginning of last summer.

Japan to Seek New Oil Pact With Dutch Indies

Entirely dissatisfied with the Netherland Indies oil agreement reached late in 1940, Japan most assuredly will reopen the question of quotas soon, it was indicated by a statement last week of Otoji Saito, Japanese consul general at Batavia, Java.

Any Japanese demand for reconsid-

United States Crude Oil Production Remains Under Demand

Estimates Compiled by The OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (Dec.)	State Allowable (Barrels Daily in Dec.)	BARRELS DAILY FOR WEEK ENDED Dec. 28	Jan. 4
TEXAS—				
Texas Panhandle	.....	.....	70,900	70,900
North Texas	.....	.....	98,400	91,200
West Central Texas	.....	.....	30,500	29,500
West Texas	.....	.....	180,800	173,800
East Central Texas	.....	.....	79,700	77,400
East Texas Field	.....	.....	300,800	300,700
South Texas	.....	.....	161,600	165,300
Texas Gulf Coast	.....	.....	211,500	211,500
Total Texas	1,277,000	1,316,657*	1,134,200	1,120,300
CALIFORNIA—				
Long Beach	.....	.....	41,400	39,700
Midway-Sunset	.....	.....	42,100	37,900
Kettleman Hills	.....	.....	38,600	39,500
Wilmington	.....	.....	80,500	80,100
Others	.....	.....	401,600	394,700
Total California	593,900	571,000†	605,200	591,900
OKLAHOMA—				
Oklahoma City	.....	.....	93,850	104,200
Seminole Area	.....	.....	100,250	100,025
Others	.....	.....	203,000	200,400
Total Oklahoma	422,600	390,000	397,100	404,625
ILLINOIS—				
Salem	.....	.....	117,000	116,700
Louden	.....	.....	69,200	71,500
Centralia	.....	.....	15,150	15,100
Other New Pools	.....	.....	112,300	113,500
Old Pools	.....	.....	10,600	10,700
Total Illinois	363,600	.....	324,250	327,500

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (Dec.)	State Allowable (Barrels Daily in Dec.)	BARRELS DAILY FOR WEEK ENDED Dec. 28	Jan. 4
LOUISIANA—				
North Louisiana	.....	.....	68,500	68,200
South Louisiana	.....	.....	221,600	223,800
Total Louisiana	280,300	287,246	290,100	292,000
KANSAS	188,400	192,400	186,350	181,450
NEW MEXICO	100,600	104,000	101,400	101,400
EASTERN STATES—				
Pennsylvania Grade	47,900	.....	76,200	68,600
Others, Eastern	43,000	.....	20,100	21,100
Total Eastern States	90,900	.....	96,300	89,700
MOUNTAIN STATES—				
Wyoming	74,500	.....	72,200	72,800
Montana	19,700	.....	18,200	18,200
Colorado	3,900	.....	3,500	3,500
Total Mountain States	98,100	.....	93,900	94,500
MICHIGAN	47,100	‡44,000	42,300	42,200
ARKANSAS	66,100	70,176	66,100	68,700
INDIANA	15,500	.....	20,200	20,500
MISSISSIPPI	13,900	.....	15,000	14,900
NEBRASKA	2,000	.....	2,600	2,600
§Total 8 Prorated States	2,976,000	2,975,479	2,822,750	2,802,575
Total United States	3,560,000	.....	3,375,000	3,352,275

*** Estimated net basic daily allowables as of December 1. Railroad Commission estimates that actual production normally is about 3 percent under the new allowable. But allowable normally increases as new wells are completed. Under December order most Texas fields were ordered shut down December 31 and January 1, 4, 5, 11, 12, 18, 19, 25, 26.**

† Recommendation of Conservation Committe of California Oil Producers.

‡ Estimate of actual production under prescribed regulations, which do not fix a definite state total allowable.

§ Texas, California, Oklahoma, Louisiana, Kansas, New Mexico, Arkansas, Michigan.

eration of the allotment of Netherlands Indies oil to be shipped to Japan will be strongly resisted by the colonial government, it is said. Officials in Batavia are described as determined that not a single ton of Netherlands Indies products, primarily oil, shall be re-exported by Japan to Germany.

Exertion of undue pressure by Japan will be met by world-wide publication of all details concerning Japan's attempts to obtain more than its allotment of Netherlands Indies oil, it is said.

Japan's demands last year were for 4,000,000 tons annually of Netherlands Indies oil products. She demanded that this be largely high-octane aviation gasoline and crude oil peculiarly well adopted for conversion into aviation gasoline. The Netherlands Indies government finally agreed to make available for Japanese purchases 1,800,000 tons annually of ordinary crude oil, kerosene, paraffin wax and other by-products.

The colonial government is not in the oil business, and the American and British companies that are in the production and refining business in the East Indies already had long-term contracts to deliver the whole exportable output of aviation gasoline and crude oil to customers in Australia, New Zealand, India, South Africa and the Straits Settlements.

Some of the existing terms of the current oil agreement between the Netherlands Indies and Japan are particularly irksome to the latter. Two terms especially objectional to Japan are that Japan must furnish the tankers in which to carry oil to Nippon, and that Japan must pay for the oil in currency of the United States of America. Japan has an over-supply of neither. Japanese tankers have been known, as late as December, 1940, to be forced to leave Pladjoe, Sumatra, without oil because the captain of the tanker had no American currency with which to pay for it.

Wholesale Prices of Refined Products

REFINED GASOLINE	Range late Last week (Cents a gal.)		Changes from week Before	
Oklahoma Refineries:				
60 Octane and under	3¾	4¼	...	...
63-66 Octane	4⅛	4½	...	...
72-74 Octane	4½	5	...	...
Mid-Western Tank Car:				
60 Octane and under	3¾	4⅛	...	...
63-66 Octane	4⅛	4½	...	...
72-74 Octane	4½	5	...	...
New York Harbor:				
68-70 Octane	5½	5½	...	...
72-74 Octane	5½	6⅝	...	...
Gulf Coast:				
60 Octane unleaded	3¼	4	...	...
65 Octane unleaded	3½	3¾	...	...
72-74 Octane leaded	3½	4¼	...	...
NATURAL GASOLINE				
Grade 26-70:				
F.O.B. Group 3	2⅜	2⅜	...	...
F.O.B. Breckenridge, Tex. 2		2	...	...
KEROSENE				
Oklahoma Refineries:				
41-43 water white	4	4⅛	...	...
42-44 water white	4⅛	4¼	...	...
Mid-Western Tank Car:				
41-43 water white	4	4⅛	...	...
42-44 water white	4	4¼	...	...
New York Harbor	5½	5½	...	...
RANGE OIL				
At Oklahoma Refineries	3¾	4	...	...
In Mid-Western Market, Group 3, basis	3⅞	3⅞	...	...
LIGHT FUEL OILS				
Oklahoma Refineries:				
No. 1 straw	3½	3¾	...	...
No. 3	3⅜	3½	...	...
Mid-Western Tank Car:				
No. 1 white	3¾	4	...	...
No. 3	3¼	3½	...	...
New York Harbor:				
No. 1	5½	5½	...	...
No. 3	4⅞	4⅞	...	...

HEAVY FUEL OILS	Range late Last week (Per Bbl.)		Changes from week Before	
Oklahoma Refineries:				
No. 6	$0.60	$0.60	...	...
Mid-Western Tank Car:				
No. 5	.75	.85	...	...
No. 6	.55	.60	...	...
New York Harbor:				
No. 5	1.45	1.55	...	...
No. 6	1.15	1.25	...	...
BUNKER C FUEL OIL (Per barrel, ships bunkers)				
Gulf Coast	$ .80	$ .90	...	...
New York Harbor	1.15	1.25	...	...
DIESEL OIL (Per barrel, ships bunkers)				
Gulf Coast	$1.50	$1.70	...	...
New York Harbor	2.00	2.00	...	...
Los Angeles Basin, 27 gravity	1.15	1.35	...	...
LUBRICATING OIL (Cents a gal.)				
Oklahoma Refineries:				
Bright Stock, 150-160 viscosity at 210°, 10-25 pour test	12	15½	—1	...
Neutral oil, pale No. 3 color, 150 viscosity at 100°, 0-10 pour test	8	10¼	...	...
Western Pennsylvania:				
Bright Stock, 145-155 viscosity at 210°, 25 pour test	12	13	...	...
Neutral Oil No. 3 color, 150 viscosity at 70°, 25 pour test	19	20	...	...

CALIFORNIA CRUDE OIL PRICES

Posted effective February 1, 1940. All gravities above those quoted take highest price offered in that field.

Gravity	Wilmington	Signal Hill (Long Beach) El Segundo	Seal Beach	Huntington Beach	Inglewood	Playa del Rey	Olinda, Brea, Canon	Athens-Rosecrans	Elwood Terrace	Torrance	Richfield	Whittier, East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	Newhall, McKittrick, Kern River, Round Mt., Kern Front	Greeley Canal	Coles Levee, Richfield Western	Mountain View	Elk Hills, Buena Vista Hills, Midway-Sunset, Lakeview Area	Lost Hills	Coalinga	Wheeler Ridge	Kettleman Hills
14-14.9	$0.60	$0.65	$0.64	$0.63	$0.64	$0.65	$0.61	....	....	$0.65	$0.61	$0.61	$0.62	$0.63	....	$0.60	....	....	....	$0.60	$0.60	$0.60	....	....
15-15.9	.60	.65	.64	.63	.64	.65	.61	....	....	.65	.61	.61	.62	.63	....	.60	....	....	....	.60	.60	.60	....	....
16-16.9	.60	.65	.64	.63	.64	.65	.61	....	....	.65	.61	.61	.62	.63	....	.60	....	....	....	.60	.60	.60	....	....
17-17.9	.62	.65	.64	.63	.68	.65	.61	....	....	.65	.61	.61	.62	.63	....	.60	....	....	....	.60	.60	.60	....	....
18-18.9	.64	.65	.64	.63	.71	.65	.65	....	....	.68	.61	.61	.62	.63	....	.60	....	....	....	.60	.60	.60	....	....
19-19.9	.69	.69	.64	.67	.75	.70	.69	....	....	.72	.61	.65	.62	.63	....	.60	....	....	$0.60	.64	.64	.61	$0.60	....
20-20.9	.73	.73	.64	.72	.79	.76	.74	....	....	.75	.65	.69	.62	.67	....	....	....	....	.60	.69	.69	.62	.60	....
21-21.9	.78	.78	.64	.76	.82	.81	.78	....	....	.79	.69	.73	.62	.72	$0.63	....	....	....	.64	.74	.74	.66	.60	....
22-22.9	.82	.82	.69	.81	.86	.86	.82	....	....	.82	.73	.77	.66	.76	.63	....	....	....	.68	.79	.78	.70	.63	....
23-23.9	.86	.86	.75	.85	.89	.92	.86	$0.71	....	.86	.78	.82	.71	.81	.67	....	....	....	.71	.84	.82	.74	.67	....
24-24.9	.90	.90	.80	.90	.93	.97	.90	.77	....	.89	.82	.86	.75	.85	.72	....	....	....	.75	.89	.86	.78	.71	....
25-25.9	.95	.95	.86	.94	.96	1.02	.95	.82	....	.93	.86	.90	.80	.89	.77	....	....	....	.79	.94	.90	.82	.75	....
26-26.9	.99	.99	.91	.99	1.00	1.08	.99	.88	....	.96	.90	.94	.84	.94	.82	....	....	....	.83	.99	.95	....	....	....
27-27.9	1.03	1.03	.97	1.03	1.04	F.O.B.	1.03	.94	....	1.00	.94	.98	.89	.98	.87	....	$0.83	$0.92	.87	1.04	.99	....	....	....
28-28.9	1.07	1.07	1.02	1.07	1.07	Pipe Line	1.07	.99	....	1.03	.98	....	.93	1.02	.91	....	.86	.96	.91	1.09	1.03	....	....	....
29-29.9	1.10	1.10	1.07	1.11	1.10	....	1.10	1.04	———	1.06	1.02	....	.98	1.06	.96	....	.90	.99	.95	1.14	1.07	....	....	....
30-30.9	1.14	1.14	1.12	1.15	1.14	....	1.14	1.09	F.O.B.	1.09	....	....	1.02	1.10	1.01	....	.94	1.02	.99	1.19	1.11	....	....	....
31-31.9	....	....	....	....	1.17	....	1.17	1.14	Ship	....	....	....	1.07	1.14	1.05	....	.98	1.06	1.02	1.24	....	....	....	....
32-32.9	....	....	....	....	1.20	....	1.20	1.19	———	....	....	....	1.11	1.18	1.09	....	1.02	1.09	1.06	1.29	....	....	....	....
33-33.9	....	....	....	....	....	....	....	1.24	$1.21	....	....	....	1.15	1.22	1.14	....	1.06	1.13	1.10	1.34	....	....	....	$1.13
34-34.9	....	....	....	....	....	....	....	1.29	1.25	....	....	....	1.20	1.26	1.19	....	1.10	1.16	1.14	....	....	....	....	1.17
35-35.9	....	....	....	....	....	....	....	1.34	1.29	....	....	....	1.24	....	1.23	....	1.14	1.20	....	....	....	....	....	1.21
36-36.9	....	....	....	....	....	....	....	1.39	1.33	....	....	....	1.28	....	1.27	....	1.18	1.23	....	....	....	....	....	1.25
37-37.9	....	....	....	....	....	....	....	1.44	1.37	....	....	....	1.33	....	1.31	....	1.22	1.26	....	....	....	....	....	1.29
38-38.9	....	....	....	....	....	....	....	1.49	....	....	....	....	1.37	....	1.36	....	1.25	1.30	....	....	....	....	....	1.33
39-39.9	....	....	....	....	....	....	....	1.54	....	....	....	....	1.42	....	....	....	1.29	1.34	....	....	....	....	....	1.38
40-40.9	....	....	....	....	....	....	....	1.59	....	....	....	....	1.46	....	....	....	1.33	1.37	....	....	....	....	....	....
41-41.9	....	....	....	....	....	....	....	....	....	....	....	....	1.50	....	....	....	1.37	1.40	....	....	....	....	....	....
42-42.9	....	....	....	....	....	....	....	....	....	....	....	....	1.54	....	....	....	1.41	1.44	....	....	....	....	....	....
43-43.9	....	....	....	....	....	....	....	....	....	....	....	....	1.59	....	....	....	1.45	1.47	....	....	....	....	....	....
44-44.9	....	....	....	....	....	....	....	....	....	....	....	....	1.63	....	....	....	1.49	1.51	....	....	....	....	....	....
45-45.9	....	....	....	....	....	....	....	....	....	....	....	....	1.67	....	....	....	1.53	1.54	....	....	....	....	....	....
46-46.9	....	....	....	....	....	....	....	....	....	....	....	....	1.71	....	....	....	1.57	1.57	....	....	....	....	....	....
47-47.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.61	....	....	....	....	....	....	....
48-48.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.64	....	....	....	....	....	....	....

CRUDE OIL PRICE SCHEDULES

Mid-Continent Gravity Scale Prices—Posted October 11-13, 1938, Except as Shown Under Headings

(Some fields of Mid-Continent have flat price postings, and are shown separately)

Gravity	[7]Okla.-Kans.	[10] North La.-Ark. 10-17-40	[9] Atlanta, Ark. 10-17-40	North & W. Central Tex.	East Central Tex.	Gray Co. Tex.	Carson, Hutchinson Co. Tex.	[1]Tomball, Tex. Type	West Tex.-New Mex.	[2]Gulf Coast (Tex.-La.) 10-2-39	[3]Some La. Gulf Areas 10-2-39	Jennings, La.	[4]Anahuac, Tex. Type 10-2-39	[5]Refugio, Tex. Type 10-2-39	[6]Mirando, Tex. Type 10-2-39	[8]Salt Creek, Wyo. (except Tensleep)
19–19.9	.....	.....	.....	.....	.....	.....	.....	.....	*$0.53	*$0.86	*$0.86	.....	*$0.81	*$0.91	*$0.86	.....
20–20.9	$0.60	.....	.....	.....	.....	.....	.....	.....	.55	.88	.88	.....	.83	.93	.88	$0.70
21–21.9	.63	.....	.....	.....	.....	.....	.....	.....	.57	.90	.90	.....	.85	.95	.90	.72
22–22.9	.66	.....	.....	.....	.....	.....	.....	*$0.95	.59	.92	.92	.....	.87	.97	.92	.74
23–23.9	.69	.....	.....	.....	*$0.78	.....	.....	.97	.61	.94	.94	.....	.89	.99	.94	.76
24–24.9	.72	*$0.73	*$0.63	*$0.71	.80	.....	.....	.99	.63	.96	.96	.....	.91	1.01	.96	.78
25–25.9	.75	.75	.65	.73	.82	.....	.....	1.01	.65	.98	.98	.....	.93	1.03	.98	.80
26–26.9	.78	.77	.67	.75	.84	.....	.....	1.03	.67	1.00	1.00	.....	.95	1.05	1.00	.82
27–27.9	.81	.79	.69	.77	.86	.....	.....	1.05	.69	1.02	1.02	.....	.97	1.07	1.02	.84
28–28.9	.84	.81	.71	.79	.88	*$0.72	*$0.67	1.07	.71	1.04	1.04	.....	.99	1.09	1.04	.86
29–29.9	.87	.83	.73	.81	.90	.74	.69	1.09	.73	1.06	1.06	.....	1.01	1.11	1.06	.88
30–30.9	.90	.85	.75	.83	.92	.76	.71	1.11	.75	1.08	1.08	.....	1.03	1.13	1.08	.90
31–31.9	.92	.87	.77	.85	.94	.78	.73	1.13	.77	1.10	1.10	*$0.87	1.05	1.15	1.10	.92
32–32.9	.94	.89	.79	.87	.96	.80	.75	1.15	.79	1.12	1.12	.89	1.07	1.17	1.12	.94
33–33.9	.96	.91	.81	.89	.98	.82	.77	1.17	.81	1.14	1.14	.91	1.09	1.19	1.14	.96
34–34.9	.98	.93	.83	.91	1.00	.84	.79	1.19	.83	1.16	†1.16	.93	1.11	1.21	1.16	.98
35–35.9	1.00	.94	.84	.93	1.02	.86	.81	1.21	.85	1.18	.....	.95	1.13	1.23	1.18	1.00
36–36.9	1.02	.95	.85	.95	1.04	.88	.83	1.23	.87	1.20	.....	.97	1.15	1.25	1.20	1.02
37–37.9	1.04	.96	.86	.97	1.06	.90	.85	1.25	.89	1.22	.....	.99	1.17	1.27	1.22	1.04
38–38.9	1.06	.97	.87	.99	1.08	.92	.87	1.27	.91	1.24	.....	1.01	1.19	1.29	1.24	1.06
39–39.9	1.08	.98	.88	1.01	1.10	.94	.89	1.29	.93	1.26	.....	1.03	1.21	1.31	1.26	1.08
40 & Up	1.10	.99	.89	1.03	1.12	.96	.91	1.31	.95	1.28	.....	1.05	1.23	1.33	1.28	1.10

* Minimum price and applies also to purchases of lower gravity.

† Maximum price and applies also to purchases of higher gravity.

[1] Tomball, Raccoon Bend (Deep) and Satsuma.

[2] Includes Amelia, Barbers Hill, Big Creek, Blue Ridge, Clear Lake, Cotton Lake, Esperson, Fannett, Goose Creek, Hankamer, Lovells Lake, Lochridge, Moore, Mykawa, Nome, Orange, South Liberty, Spindle Top, Sugar Land, Thompsons, Webster, Hastings, South Houston and West Beaumont.

[3] Includes Berwick Bay, Bay St. Elaine, Caillou Island, Chacahoula, Dog Lake, Edgerly, Four Isle, Gillis, Grand Bay, Hackberry, Horseshoe Bayou, Iberia, Jefferson Island, Lake Barre, Lake Pelto, Leesville, Port Barre, Starks, Timballier Bay, Quarantine Bay, and Vinton fields.

[4] Anahuac, Dickinson, Gillock, Cedar Point, Fairbanks, Turtle Bay, Hull, Orange, Pierce Junction, Batson, Caplen, Humble, North Dayton, Saratoga, Sour Lake, South Esperson, Spindle Top, West Orange, Thompson (deep), and Raccoon Bend (shallow) fields.

[5] Includes Saxet, E. White Point, Greta, O'Connor McFadden, Taft, Plymouth and Tom O'Connor fields.

[6] Includes Duval, Jim Hogg, Webb and Zapata counties, Texas, and Heyser and Placedo fields.

[7] Oklahoma Pipe Line and Magnolia schedules.

[8] Includes La Barge, Midway Dome, Dutton.

[9] Also Buckner, Magnolia, Schuler (Jones Sand), Village.

[10] Add 10 cents for Bunkie, Eola, Olla.

Mid-Continent Flat Prices

	Flat Price	Date Posted
Arkansas:		
Big Creek, Dorcheat, McKamie	$0.95	10–17–40
Smackover heavy	0.73	10–12–38
Louisiana:		
Cotton Valley	1.10	10–17–40
Garden Island	1.24	10–12–38
Gibson	1.04	10–11–38
Lafitte	1.04	10–12–38
Rodessa, Shreveport	1.05	10–17–40
Texas:		
Cayuga	.78	10– 2–39
East Texas	1.10	10–12–38
Talco	.65	10– 2–39
Livingston, Cleveland	1.10	10–12–38
Van	.93	10–12–38
Pettus	1.29	10–12–38
Pecos County	.78	10–12–38
Pecos Shallow	.65	10–12–38
Luling	.87	10–12–38
Lytton Springs	.99	10–12–38
Salt Flat, Darst Creek, Hilbig, Carroll, Clark and Zoboroski	.96	10–11–38
Flour Bluff-Jim Wells Co.	1.23	10–11–38
Guerra	1.06½	5– 8–39
Seabreeze, Willow Slough, La Belle, Hardin, S. China	1.10	9–14–39
Clay Creek	.85	10–13–38
Conroe	1.27	10–11–38
Long Lake	1.08	10–19–38

Middle West Prices

Lima, Ohio	$0.90	10–13–38
Illinois, old fields	1.00	8–23–40
Illinois Basin	1.15	8–21–40
Lake Centralia-Salem, Illinois	1.15	8–21–40
Princeton, Indiana	1.00	8–23–40
Sw. Ind.-Se. Ill.: N. Griffin, S. Griffin, Phillipstown, New Harmony, Storms, Iron	1.15	8–21–40
Western Kentucky	1.05	8–21–40
Birk City, Western Kentucky	1.05	8–21–40
Kentucky River, Eastern Ky.	1.20	8–21–40
Big Sandy River, Eastern Ky.	1.12	8–21–40

Michigan Prices

	Flat Price	Date Posted
Central (Basin):		
Porter, Greendale, Crystal, Wise, Midland, Vernon	$1.22	1– 2–41
Buckeye, Edenville, Bentley, Beaverton	1.20	1– 2–41
Freeman, Sherman, Redding	1.17	1– 2–41
Arenac, Ogemaw, W. Branch	1.02	1– 2–41
Southwest (Shallow):		
Allegan, Kent Counties	1.18	8–24–40
Van Buren Co., Bloomingdale	1.08	5– 1–40
Adams–Arenac	1.05	1– 2–41
Clare	.81	8–24–40

Rocky Mountain States Prices

Colorado:		
Canon City, Ft. Collins, Wellington, Moffat and Florence	$0.90	10–11–38
Iles, Light	.98	10–11–38
Iles, Heavy	.92	10–11–38
Montana:		
Cat Creek	1.10	10–11–38
Cut Bank	1.00	1– 1–40
Sunburst	.80	1– 1–40
New Mexico:		
Artesia	.77	10–11–38
Hogback	1.00	10–11–38
Wyoming:		
Big Muddy	.98	10–11–38
Byron	.55	10–11–38
Dry Creek	.92	10–11–38
Elk Basin	.90	10–11–38
Frannie, Light	.55	10–11–38
Frannie, Heavy	.42	10–11–38
Garland	.50	10–11–38
Grass Creek, Light	.90	10–11–38
Grass Creek, Heavy	.40	10–11–38
Hamilton Dome	.35	10–11–38
Lance Creek	.77	10–11–38
Mill Creek	.72	10–11–38
Oregon Basin	.40	4–20–40
Osage	1.30	10–11–38
Poison Spider	.59	10–11–38
Rock Creek	1.00	10–11–38
Tensleep	.646	10–11–38

Eastern States Prices

	Flat Price	Date Posted
Bradford-Allegany	$2.15	12–17–40
Sw. Pa. Pipe Line	1.80	12–17–40
Eureka Pipe Line, W. Va	1.74	12–17–40
Corning Grade, Ohio	1.12	11– 4–39
Buckeye Crude, Ohio	1.55	7–12–40

Major Price Changes

	Penna. Grade	Mid-Cont. (36 Gr.)	Calif. (26 Gr.)
Sept. 6, 1933	Up 10	Up 10	Up 15
Sept. 8, 1933	.....	Up 15	.....
May 1, 1934	Up 10	.....	.....
Nov. 6, 1934	Cut 25	.....	.....
Dec. 6, 1934	Cut 25	.....	.....
Jan. 4, 1935	Up 15	.....	.....
Feb. 4, 1935	Up 15	.....	.....
May 16, 1935	Cut 15	.....	.....
June 26, 1935	Cut 15	.....	.....
July 16, 1935	Cut 10	.....	.....
Aug. 29, 1935	.....	.....	Cut *1
Sept. 6, 1935	Up 5	.....	.....
Oct. 29, 1935	Up 15	.....	.....
Nov. 1, 1935	.....	.....	Up *28
Nov. 18, 1935	Up 15	.....	.....
Dec. 6, 1935	.....	.....	Up *9
Jan. 9, 1936	.....	Up 10	.....
Jan. 13, 1936	Up 15	.....	.....
Mar. 7, 1936	.....	.....	Up *18
Dec. 28, 1936	Up 12	.....	.....
Jan. 28, 1937	.....	Up 12	.....
Feb. 24, 1937	Up 10	.....	.....
June 7, 1937	Up 15	.....	.....
Sept. 1, 1937	Cut 22	.....	.....
Oct. 12, 1937	Cut 25	.....	.....
Dec. 1, 1937	Cut 15	.....	.....
Mar. 7, 1938	Cut 17	.....	.....
June 13, 1938	Cut 25	.....	.....
Sept. 1, 1938	Cut 12	.....	.....
Oct. 11, 1938	.....	Cut 20	.....
Jan. 21 1939	Up 12	.....	.....
Feb. 2, 1939	Up 8	.....	.....
Mar. 6, 1939	Up 12	.....	.....
Oct. 6, 1939	Up 25	.....	.....
Nov. 1, 1939	Up 15	.....	.....
Dec. 1, 1939	Up 10	.....	.....
Jan. 1, 1940	Up 25	.....	.....
Feb. 1, 1940	.....	.....	Cut *7
May 22, 1940	Cut 25	.....	.....
June 18, 1940	Cut 25	.....	.....
July 12 1940	Cut 25	.....	.....
Aug. 28, 1940	Cut 15	.....	.....
Nov. 12, 1940	Up 15	.....	.....
Dec. 17, 1940	Up 15	.....	.....

* Signal Hill 26 gravity.

Crude Production Taxes

In all states other than Texas, levies are severance taxes, collected in lieu of all other taxes, with exception of small special assessments made in Louisiana and Oklahoma, as shown below.

In Texas, any political subdivision as well as the state has power to tax, and state itself levies special taxes in addition to gross production tax, as shown below.

Arkansas—2.6 percent of gross market value.

California—.66443 mills per barrel of oil produced and 17.39 cents an acre on proved lands.

Louisiana—From 4 to 11 cents a barrel, depending upon gravity, average being 7½ to 8 cents; in addition, special taxes may be levied on well equipment, bringing total tax to average around 8¾ cents a barrel.

Montana—Two percent of gross value at well and ⅜ of 1c per barrel.

New Mexico—Severance tax of 2 percent on oil and gas.

Oklahoma—Five percent of gross value less royalty interests; in addition, surplus warehouse stocks may be taxed by counties.

Texas—Gross production tax is 2⅝ cents a barrel or 2¾ percent, whichever is higher, and averaged 2.94 cents in 1939. In that year, total tax on average barrel produced was, however, 9.23 cents, having included following levies: gross receipts 0.14 cents, regulatory 0.19 cents, state ad valorem 0.98 cents, other state taxes 0.62 cents, and local ad valorem 4.30 cents.

Wyoming—Production tax based upon state and county assessments.

Illinois

Trenton Test in Salem Field Shuts Down to Study Samples

As the new year began, the eyes of Illinois' oil industry again were fastened on the Lake Centralia-Salem field of Marion County where the first Trenton-lime test, Paul Rossi's Brooks 8, NE SW 29-2n-2e, was shut down at 4510 feet for analyzation of samples. Although the well has been drilled tight, it was apparent that at least a show of oil had been found in the Trenton. It was unofficially reported that only a foot of pay had been drilled when the test was shut down. Brooks 8 was originally a Devonian producer initialing more than 10,000 barrels a day, at that time the largest completion in Illinois. It was deepened from 3432 feet to its present level with cable tools. Pipe is being set.

The Salem field is the most productive area in Illinois and still is producing about 120,000 barrels a day although at the peak of Devonian development it made as much as 290,000 barrels daily to become the second most productive area in the nation. The pool has five producing zones, the Benoist and Aux Vases sands, and McClosky, St. Louis and Devonian limes.

Another deep test in Marion County, B. E. Martin's Robinson 1, SE SW 4-2n-1e, Sandoval field, was scheduled to resume drilling from 4965 feet, where it was shut down for several days. Operators expect to enter the unexplored St. Peter within a few feet.

New Hamilton Field

Other auspicious developments in Illinois' oil week included the opening of another Hamilton County field, and the recovery of saturation at two wildcats, one in White and the other in Pope County.

The Hamilton County discovery, Dick Duncan's Zeller 1, near Dahlgren in SE NE NE 34-3s-5e, a Gulf Refining Company farmout, was being completed in McClosky lime at 3337-59 feet. When plug was drilled, well began flowing and filled a 100-barrel tank in 3 hours, 45 minutes. Hole was swabbed dry, and in 20 minutes filled up with 250 feet of oil. After tubing was run the well began flowing natural. Some observers estimated it would make from 350 to 400 barrels a day. Nearest production is about six miles.

The southernmost test in Illinois, L. V. Garnier et al's Peoples 1, NE NE NE 30-11s-5e, Pope County, had 300 feet of fluid in the hole and was to be acidized. Casing was cemented to test McClosky lime at 2095-2106 feet. The test is far removed from production, near the village of McCormack, and 3¼ miles southwest of a test recently abandoned by The Ohio Oil Company.

The White County wildcat, Cochrane et al's Nettie Golden 1, SW SE NE 29-5s-14w, two miles south of production on Ribeyre Island, was drilling plug to test Waltersburg pay at 2255-80 feet.

Also drilling plug was a long-watched wildcat in Franklin County, A. S. Adkins' Orient Coal Company 1, NE SW SE 24-6s-2e, at the edge of Benton. Casing was cemented to test Tar Springs pay at 2111-23 feet about two months ago. Benton's city council recently issued 32 townsite drilling permits to H. H. Wegener, drilling contractor for the test, after Wegener posted $160,000 in bonds and $6400 in permit fees. Adkins Orient Coal Company 1-B, four miles south of Benton, SE NE NW 12-7s-2e, was shut down because a nearby creek had overflowed its banks. Tools from 1-B will be moved to the townsite after the test is completed, for the first exploration in Benton.

Second producer in the new Omaha field, Gallatin County, Cameron Brothers' Rister 1, NE NE NW 4-8s-8e, was being given a second shot of nitro after swabbing about 280 barrels of oil in 12 hours from Palestine sand at about 1700 feet.

Third producer in the new Mason field, Effingham County, apparently will be Hinkle Townsite 1-B, NW SW NE 22-6n-5e, which was to drill plug. Excellent saturation was reported in McClosky lime.

Fayette Wildcat Deepening

Allied Oil Company's Ross Walker 1, Fayette County wildcat in Section 9-4n-1w, west of Patoka, was drilling below 1365 feet. The Benoist was due at about 1450 feet. At an elevation of 452 feet the test picked up the Cypress at 1242 feet.

Two offsets to a Washington County discovery well have been abandoned or are shut down; W. C. McBride, Inc.'s Frieman 1, SE NW NW 29-3s-4w, Oakdale township, one location west of DeKalb Agricultural Association's Hunleth 3, a Benoist discovery, and Joe Murphey's venture one location east of the discovery. McBride abandoned its test, and Murphey's test was shut down at 1040 feet on orders after finding Benoist dry. The discovery well was initialed at about 150 barrels of oil and 100 barrels of water in 24 hours from Benoist sand.

Magnolia Petroleum Company's deep wildcat test in Jackson County, Ella Smith Heirs 1, NE 9-8s-3w, was drilling at 2858 feet. At an elevation of 668 feet, it topped Glen Dean at 685 feet, Cypress at 968 feet, Paint Creek at 987 feet, Benoist at 1097 feet, Aux Vases at 1166 feet, and St. Genevieve at 1298 feet. It may be carried to the St. Peter, although it is generally believed the Trenton will be the last formation tested.

A survey of 1940 development in Illinois revealed production totaled 146,000,000 barrels, as compared with 94,302,000 barrels in the preceding year. The yield was valued at $160,000,000. In 1936, the pre-boom era, Illinois produced 4,500,000 barrels. There were 25 fields discovered, bringing to 78 the total number of the state's new producing areas. The number of producing counties was increased by six to 21. Drilling costs for the year were estimated to be $29,000,000. Wildcat exploration was 8 percent successful, with 36 producers among the 454 tests in virgin territory. Eleven of the successful wildcats were listed as field extensions.

Indiana

Pike Wildcat Spuds for Test of McClosky Lime

Four miles northeast of Princeton, Whisenant & Trenchard, contractors, spudded Schroeder and Hermann's Stroble 1, SW SW SW 34-1s-9w, Pike County wildcat McClosky test near old shallow field production.

In Posey County, southern Point Township, north of Niederst, Basin Drilling Company set surface casing for Oakland City College 2, NE NE SW 16-8s-14w, Sun Oil Company farmout and south offset to Oakland City College 1, Aux Vases sand and McClosky lime discovery well.

Abandoned was a closely watched Posey County wildcat, northeast of New Harmony field production and southeast of the South Griffin field, Anderson Griffin Properties' Frank O. Faul Heirs 1, NE NE SE 11-4s-14w. Hole was bottomed at 3150 feet, with no shows reported through a dry McClosky. The test was reported 100 feet low, structurally.

In southwest Robinson Township, Posey County, Gulf Refining Company's Dickhaut 2, SW SW SW 5-6s-12w, made only salt water from a sand at 703 feet. Hole was plugged back from 2439 feet, through a dry Cypress.

In Greene County, ½ mile southwest of Switz City, L. B. Jackson and Midwest Development Company's Holmes 1, NW NW NW 22-7n-6w, was a gas-well completion, initialing 2,000,000 feet at 1730 feet. Hole was plugged back from 1764 feet.

Forest City Basin

Falls City Defined North; Shubert Outpost Sets Casing

Falls City pool was further defined on a northward trend as Liberty Development Company plugged Fehr 1, C NW SE 31-2n-16e, at 2595 feet in Hunton lime, topped at 2568 feet. Misener sand showed water at 2568 feet, while Red Hematite was logged at 2364 feet.

Light spotted saturation was recovered at W. H. Martgan et al's Smith 1, C E½ NW NW 31-3n-16e, 1¼ miles west and slightly south of Shubert pool, Richardson County, in Hunton lime. Topped at 2513 feet, a core at 2515-20 feet gave recovery of 18 inches with no porosity or shows. Core at 2520-28 feet showed 3½ feet of dry lime. At 2528-39

feet, a 7½-foot section showed little porosity, but light saturation in the bottom foot of the core. String of 5½-inch casing was cemented at 2515 feet, and standard tools were rigged up to drill plugs at 2539 feet.

In Nemaha County, Frank Engles et al's Wheeler 1, NEc 9-4n-14e, cemented 2540 feet of 7-inch liner. Hunton lime was topped at 2658 feet, and hole was being cleaned out at 2668 feet for deepening and testing.

Pioneer Oil Company et al's Hough-Hill 1, C SE SW 6-1n-16e, a mile northwest of Falls City pool, was underreaming 6-inch casing at 2195 feet in Mississippi lime, topped at 2127 feet. Powers & Stalder are drilling below 2200 feet at Lee 1, NE NW NE 16-1n-14e, south of Ogle pool.

Francis Krone and Skelly Oil Company's Morehead 1, C SE NE 35-4n-16e, deep wildcat test in Nemaha County, was below 3500 feet, projected to Arbuckle lime.

Turner and Leiker et al's Kiechel 1, NEc SE 4-5n-13e, Nemaha County, was a new location for Nebraska. Ellis Brothers et al's Armstrong 1, C SW NE 10-6n-15e, remains a location.

Shell Oil Company's Davis 1, SWc 18-13n-9e, 2 miles south of Welty, Okfuskee County, showed unfavorably on production test. In 14 hours, swab recovered nine barrels of oil and 51 barrels of water. After swabbing to bottom, hole filled 900 feet with water in four hours. Wilcox sand was logged at 4107-28 feet. Location is on a seismograph high, with some 500 acres controlled by the operator.

Wildcat Failures

Simpson-Roodhouse Drilling Company et al's Montpelier 1, SWc NW 20-2n-6e, wildcat west of West Fitts pool, Pontotoc County, topped Simpson sand at 4386 feet and cored at 4445-52 feet for 5½ foot recovery of green and white sand, dry but porous. Hole was plugged at 4818 feet after running electric log to 4300 feet, where a fishing job failed.

J. E. Crosbie et al's Moore 1, NEc NW 29-19n-2e, ½-mile south of West Stillwater pool, Payne County, took drill-stem test with packer set at 4432 feet, opened for 30 minutes. It recovered a small show of gas with 1500 pounds casing pressure. Hunton lime was topped at 4639 feet, Sylvan 4683 feet, Viola 4755 feet, Dense 4794 feet, Dolomite 4815 feet, Sandy Dolomite 4821 feet, Wilcox 4834 feet, and ran electrolog to bottom at 4847½ feet, where hole was plugged.

Oklahoma

Okemah Area Revived by Gilcrease Zone Oil Well

Seldon Henry et al revived devolopment north of Okemah, Okfuskee County, at Dudgeon 1, NE SW SE 36-12n-9e, wildcat ¼ mile north of an old exhausted Gilcrease producer drilled by Shell Oil Company in 1926.

The first strike in Oklahoma in 1941, preliminary tests rate it good for 1000 barrels of oil daily. Gilcrease zone was topped at 3055 feet, and a good show of oil logged at 3080-3085 feet. In deepening, Sandy Wapanucka was topped at 3260 feet. Cromwell at 3284 feet for a small show of oil. Hole was carried to 3289 feet and 5½-inch casing set at 3276 feet. Cromwell sand failed to show commercially, and plug was set at 3113 feet. Operators shot with 53 quarts at 3084-3110 feet and the wildcat flowed crude over the casing head and cleaned itself out.

One mile south of this test, Portable Drilling Company abandoned Nelson 1-A, NE SE SW 1-11n-9e, at 4108 feet in dry Wilcox sand. Successive plug-back tests in Cromwell sand, topped at 3336 feet, yielded a hole full of water. Gilcrease was perforated at 3118 feet for no show, and Booch at 2843 feet was dry.

North of West Wetumka pool ¾-mile, Hughes County, Ed Scruggs opened a new gas pool in Booch sand at Black 2, NW NE NE 13-9n-10e, a west offset to a dry hole. Log disclosed Salt sand at 1700-32 feet, Booch sand at 2179-2217 feet and Gilcrease at 2545-58 feet. Hole was plugged to 2220 from a depth of 2600 feet. With 6-inch casing cemented at 2179 feet, the wildcat was completed for 671,000 feet of gas per day.

Three miles south of Micawber pool, Okfuskee County, Mid-Continent Petroleum Corporation's Stokes 1, SW SE SW 20-13n-7e, topped First Wilcox sand at 4202 feet, and cored hard while dry sand to 4300 feet. Should Second Wilcox sand prove unproductive, hole will be plugged back and a test given Hunton lime, topped at 4065 feet. Over four feet of saturation was recovered in this horizon.

Gulf Oil Corporation's Hess 1, C NE NW 33-23n-13w, deep wildcat in the Woods, Major and Alfalfa tri-county area, was rotating below 7650 feet in Mississippi lime. Thickening of this section of lime in the Western Oklahoma Basin is verified in this wildcat, which has already drilled over 1000 feet of this zone.

Between Little River and East Little River pools, Seminole County, W. A. Delaney, Jr. and Atlantic Refining Company's Clark 1, NEc SE 30-8n-7e, was drilling below 4000 feet, nearing objective Wilcox sand. Connecting of these prolific areas largely hinges on outcome of this wildcat.

Two miles southwest of Red Bank pool, Creek County, J. E. Trigg et al's Jennings 1, NW SW NE 18-16n-8e, was checking structurally high after topping Woodford shale at 3580 feet. Hole was below 3775 feet.

Kansas

Gueda Pool Has Arbuckle Lime Oil From 3737 Feet

Initial Arbuckle-lime production for Gueda Springs pool, Cowley County, was provided by Stelbar Oil Corporation's Bahruth "A" 1, NE SE NE 8-34-3e, which flowed and pumped 425 barrels of 40-gravity oil in 24 hours. Originally, this well was a Mississippi-lime producer at 3286-3312 feet. On deepening, Mississippi lime was based at 3625 feet and 5-inch casing cemented at 3673 feet. Arbuckle lime was topped at 3735 feet, and penetrated two feet when it began flowing 20 barrels hourly.

Derby Oil Company and Crow Drilling Company's Hancock Life 1, C SE SE 10-32-12w, wildcat which previously indicated a pool opener, was taken over by W. J. Coppinger for retesting. With plug set at 4450 feet in Mississippi lime, logged at 4307-4581 feet, plugs were drilled and it showed for two barrels of heavy black oil per hour. Lime was then treated with 2000 gallons of butane for penetrant, and followed up with 1000 gallons of acid. In 8½ hours, swab recovered six barrels. Previously Arbuckle lime tested dry at 4776-4840 feet. It was plugged as uncommercial.

Olson Oil Company et al have temporarily abandoned Macredie 1, C N½ NE NE 15-29-2w, five miles north of Latta pool, Sedgwick County, after swabbing four to five barrels of oil per day. Mississippi lime was cut from 3547 to 3576 feet with a fair show of oil at 3564-73 feet. When plugs were drilled out, hole filled 300 feet with oil and a small amount of salt water in 48 hours. Plugging back to 3572 feet failed to benefit oil recovery.

In wildcat territory, Alva Billings et al's Ryan 1-A, C E½ NE SE 27-8-32w, Thomas County, was fighting water intrusion. Neva lime of Permian age was topped at 3620 feet, and 8-inch pipe set at 3620 feet. Plugs were knocked out with standard tools for a show of oil at 3625-39 feet. A small oil fill-up was registered after treatment with 2000 gallons of acid at 3720-24 feet. Operators then ran 147 feet of 6-inch line to 3725 feet. Hole filled with water and a small amount of oil at 3762-65 feet. Casing will be run for a shut-off.

New Wildcat Activity

Ewers-Simpson Oil Company et al's Bundy 1, C SW SW 12-9-22w, 4 miles west of Morel pool, Graham County, had cellar and pits.

British American Oil Producing Company and Crown Petroleum Company were moving in materials at Linder 1, NEc SW 24-17-14w, three miles west of Hoisington pool, Barton County.

Three miles southeast of South Lorraine pool, Rice County, Hinkle Oil Company staked Kitchen 1, C W½ NW NE 11-18-9w.

E. W. Hamilton et al's Thole 1, C E½ SE SE 23-21-12w, north of Max pool, Stafford County, had cellar and pits.

R. E. Hess and Son were starting work at McKee 1, C E½ NE SE 8-22-8w, south outpost to Sterling pool on the Rice-Reno County lines.

Wildcat Failures

Aladdin Petroleum Corporation and Norbla Drilling Company took over Guido Piggott et al's Kuhn 1, C N½ NE NE 17-14-16w, in the old abandoned Victoria pool area, Ellis County. Arbuckle lime was dry at 3443-3500 feet and hole was plugged. Geologic log marked Topeka lime

at 2911 feet, Doge 3108 feet, Lansing 3181 feet small show of oil 3219 feet, core at 3263-73½ feet recovered 10½ feet of saturation; 3269-72 feet showed fair porosity. Kansas City lime was based at 3420 feet, and Sooy topped at 3430 feet. No test was taken in Lansing section which showed fair possibilities.

Two miles south of Udall pool, Cowley County, Earl F. Wakefield and Vollmer et al's Durham 1, C W½ NW SE 34-30-3e, cored Arbuckle lime at 3419-30 feet, but hole filled with water at 3425-30 feet and hole was abandoned. Mississippi lime proved a thick horizon, being topped at 3020 feet and based at 3307 feet.

North Texas

Fargo Has Third Horizon; Baylor Areas Extended

Third oil horizon for the Fargo pool, Northwestern Wilabarger County, was established by Amerada Petroleum Corporation's Dodson 1-B, ¼-mile north outpost, flowing 45 barrels of high-gravity oil hourly through 1-inch choke. Production is from casing perforations opposite saturation in Basal Canyon at 3982-4002 feet. The well began cleaning itself of rotary mud immediately after perforating pipe with 47 shots, and tubing was snubbed in with pressure control equipment. Dodson 1-B logged dry sand in the Cisco discovery zone at 3251-56 feet, and was drilled to 4415 feet, with the last 10 feet showing oil saturation in the Strawn before cementing 5½-inch pipe at 4412 feet. The Strawn, however, which has accounted for two small producers in the southeast sector of the 7-well pool, was not tested by the north outpost.

Big Six Oil Company's Morris 1, SEc H&TC Section 3, Block 14, Northeastern Wilbarger County strike that has been in process of completion for several weeks, is rated as a 60 to 75-barrel pumper, based upon brief swabbing tests through casing. Production is from sand at 2895-2907 feet. It is 2¼ miles northwest of Harrold, and 4 miles north of nearest production. Consolidated Oil Company's Pollan 1, 4 miles north of Tolbert and on a seismograph prospect, was drilling shale at 4370 feet on a 4500-foot depth contract.

Two Canyon lime areas in Baylor County recorded extensions. British American Oil Producing Company's Turbeville 3, SW SE NE T&NO Section 198, northwest offset to its Mabelle pool discovery, flowed 66 barrels of oil in 4 hours, then quit, after initial treatment of pay at 2526-2592 feet with 2500 gallons of acid. Turbeville 2, northeast offset to the discovery, will be drilled next. The company controls all close-in acreage, including that separating the area from the Seymour pool. Featherston-Spragin and Art's Green 1, southeast outpost for the Rendham pool, failed to flow steady when treated with 2500 gallons of acid at 3051 feet, and will be equipped to pump. Top of Canyon lime was called at 3047 feet, or two feet higher on sub-sea than the discovery. Paul B. Scott et al's Fayette 1, southeast offset to the discovery, has cemented 5½-inch pipe at 3022 feet to test Canyon saturation at 3026-31 feet.

Jack Test to Deepen

Continental Oil Company's Robertson 1, Jack County wildcat that has been producing from the Mississippian-Ellenburger contact, flowed 48 barrels of oil through ¼-inch choke on last gauge, and will be deepened to 5386 feet. Rathke Oil Company and R. C. Parker's Mosely 1, mile west of Joplin, was drilling at 5250 feet.

The Bonita pool, Montague County, recorded its eighteenth producer with completion of Sinclair Prairie Oil Company's Bonita Southeast Unit 1, rated at 1922 barrels initial through open tubing from conglomerate at 5459 feet. Nine wells are in this lower pay and seven in the 5200-foot Bend, while the above company's West Bonita Unit 2 took in both oil horizons. The company's Gilbert 2 and Howard 6 are drilling at 2720 and 2200 feet, respectively, and operations have started on Bonita Northeast Unit 1 and Doty 3. Location was made last week for Mary Admire 1, NWc of 40-acre lease.

Two Montague County wildcats are slated to plug back and test prospective producing zones passed up in fulfilling depth contracts. Tom Hunter et al's Fatheree 1, two miles west of Illinois Bend, cemented 5½-inch pipe at 3382 feet, and will plug back by stages from 5043 feet. Benson & Benson's Benton 1, 2 miles southeast of the Ringgold pool, halted in Ellenburger dolomite at 5980-6213 feet. Decision has not been made as to whether pipe will be run. J. G. Hammond, Inc.'s Jester 1, Mallard area, remained idle at 6505 feet, pending orders to deepen to the Ellenburger. G. & M. Drilling Company and Wilcox Oil & Gas Company's Bullard 1, west offset to the natural flowing discovery well of the Owens-Hults area, failed to produce after using 2000 gallons of acid in Bend lime at 6004-62 feet, and will be treated again. The well encountered small amount of salt water when deepened to 6100 feet. The absence of conglomerate in the Bend distinguishes this area from other deep pools in the district. Walter Grant et al's Stine 1, 1-1/3 miles west of production in the Ringgold pool, was due to resume coring at 5762 feet, and apparently has not encountered additional water in deepening from 5673 feet.

Among the widely scattered wildcats in the Fort Worth Basin, Amon Carter et al's Allen 1, Denton County, was drilling lime and shale at 7290 feet. In Northwestern Wise County, Cranfill & Rodgers' McKay 1 was drilling at 6410 feet, and Manahan Oil Company et al's Collier 1, northeast part of the county, was drilling at 5840 feet. Tarrant County's lone deep operation, Bruce Sullivan and Hill's Putman 1, was drilling shale at 6070 feet. In Grayson County, The Texas Company's Hutchinson 1 was fishing drill pipe at 5321 feet.

Walnut Bend Dry Hole

Second dry hole for the Walnut Bend field, Northeastern Cooke County multiple pay area, was recorded when Sinclair Prairie Oil Company's Hudspeth 2, southwest edge location, failed to produce in the 4100-foot Upper Strawn and was abandoned at 4347 feet. The area has 85 pumping and flowing wells.

Roeser & Pendleton, Inc.'s T. B. Wilson 1, offsetting production on the east edge of the Mankins pool, Archer County, responded to treatment of broken Bend pay at 4640-4798 feet with 5000 gallons of acid with a flow of 40 barrels of oil and wash water hourly, making a total of 13 producers.

The Texas Company's Wilson 6-B, offsetting deep production in the west portion of the Hull-Silk field, flowed 44 barrels of oil through ¾-inch choke on 1-hour potential gauge after using 3000 gallons of acid at 4533-57 feet, with hole bottomed at 4560 feet.

Linking of the Asylum pool, original Bend strike for North Texas, and the Vogtsberger area, Northeastern Archer County, hinges on the outcome of intermediate tests now nearing decisive depths. Gibson and O'Donohoe's Jentsch 1 is considered the key well, and was awaiting orders at 4806 feet after running electric log. W. B. Omohundro et al's Browning 1, Sc Block 87, 2/3-mile northwest of the Vogtsberger pool, which produces from the 4700-foot Lower Strawn, was awaiting production test of broken saturation in Bend at 5133-47 feet, with 5½-inch pipe at 5127 feet. Walter Gant and Barney Feagin's Curry 1, 1¾ miles southeast of production, installed machine to test saturation in the Upper Ellenburger at 5370-91 feet, with 7-inch pipe at 5370 feet. The Bend zone, topped at 5133 feet, or eight feet lower than the above test, registered broken saturation at 5156-5210 feet. Omohundro et al's Coleman 1, wildcat one mile north of Scotland, was drilling at 5459 feet on a 6000-foot contract. Top of Bend was called at 5279 feet, or 297 feet lower than the Shell-Coleman pool discovery.

West Texas

Crane County Wildcat Cores Devonian-Lime Saturation

Gulf Oil Corporation's University 1-F, Crane County Ordovician prospect, has logged favorable oil saturation at intervals in coring Devonian lime series, and was drilling at 8898 feet. The possible producing zones prevail in soft sections that alternate with exceedingly hard cherty-lime in the Devonian. No drill-stem tests have been attempted because of open hole below the 10-inch casing seat at 2928 feet. University 1-F, is five miles west of the north end of the Church & Fields area, and 10 miles east by north of the Sand Hills field. It is slated to continue to the Ellenburger horizon, then run electrolog to determine advisability of landing pipe for a production test.

Magnolia Petroleum Company's Markey 1, ½-mile northwest of the Simpson-sand discovery of the Abell pool, Northern Pecos County, altered its casing program in order to test a promising pay zone in the Lower Permian at 3447-62 feet. Recovered cores carried evidence of oil and gas, and possibly water near the bottom. String of 9-5/8-inch pipe was cemented at 3535 feet, total depth, and was due to be perforated at 3443-49 feet late last week. The company's State-Sharp 1, 1¼

miles northwest of the 5300-foot discovery, was drilling at 2265 feet.

Production test was due late last week for Culbertson & Irwin, Inc.'s Heiner 1, C NE NE GC&SF Section 589, Pecos County wildcat near the Byrne sector of the Pecos Valley field, with 7-inch pipe at 5130 feet. Broken saturation in the Ellenburger dolomite at 5128-88 feet is the objective, and should this zone fail to produce, perforations will be made opposite possible gas pay in the Lower Permian at 4528-45 and 4625-28 feet.

A second test for the Silurian pay zone in the Shipley area, Ward County, has been authorized by Gulf Oil Corporation on its Wristen 9015-acre lease. Wristen 6 was spotted near C W¼ of E¼ H&TC Section 18, Block 5, or 1406 feet east of the company's discovery, which earned potential rating of 3049 barrels of 32.2-gravity oil and 3,500,000 feet of gas after using acid in pay at 7010-60 feet. Production carries a trace of hydrogen sulphide, and besides being the only Silurian crude in Texas, the oil solidifies at 75 degrees. The latter creates a transportation problem that may be overcome by mixing the well's 150-barrel daily allowable with higher gravity oil produced from the regular Permian. The discovery registers closed-in pressures of 2900 pounds on casing and 2790 pounds on tubing, with bottom hole pressure of 3320 pounds. Temperature readings at the 6500-foot level after completion averaged 134 degrees F.

South Magnolia-Sealy Extended

Northeast extension was given the South Magnolia-Sealy pool, Ward County, when Magnolia Petroleum Company's Sealy 3-41, near SW NW SE Section 41, Block F, flowed 416 barrels of 29-gravity oil through 1-inch choke in 24 hours, with gas/oil ratio of 428/1. Production is from four perforations in blank liner at 2907-10 feet, and six shots at 2916-19 feet. Protection string of 7-inch was cemented at 2550 feet as a safeguard against blowout from prolific gas in the Yates, and blank 5½-inch liner was landed on bottom at 2921 feet. This completion is the third oil well for the reef type structure, discovered by Atlantic Refining Company after Magnolia Petroleum Company developed wet gas production to the north on its 24-section lease.

Roeser-Pendleton, Inc. was starting a projected Delaware test as a north offset to the Quito pool wet gas discovery in Ward County, having received 1000 acres of checkerboard acreage from Merry Bros. & Perini, who will be carried for one-half interest in the first test, listed as Bird Hays 1, south corner of H&TC Section 164, Block 34. Gas from the discovery is marketed at Pecos by Southern Union Utilities Company. Fifteen-section lease block has been assembled in Northwestern Ward County by J. E. Fitz-Patrick et al to try and finance drilling of a test through the Delaware, or to 8000 feet. The group spudded W. R. Caddie 1, south corner W&NW Section 23, Block 1, to fulfill lease requirements.

Gulf Oil Corporation's Mallett 4, Terry County semi-wildcat 2½ miles west of the south end of the Slaughter field, proved dry in drilling to 6000 feet to explore the Holt lime, and tested water after plugging back to the regular Permian at 5070 feet, with 5½-inch pipe at 4914 feet. The well is to be given an extended swabbing test to try and exhaust the water before acidizing.

East Texas

Hawkins Area Due to Have Dozen Rigs Busy This Month

The completion of a prolific oil well in the Hawkins townsite and 3½ miles southeast of the discovery pumper in the Woodbine series opens an expansive area for immediate development in southwestern Wood County and 16 miles west of the Gladewater sector of the East Texas field. Prompt extension of the oil area one mile west by north of the townsite was heralded by a wild gasser that blew out from the sub-Clarksville sand overlying the Woodbine series.

A moderate development program was already in store for the Hawkins area which is classed as a dome type of structure somewhat similar to the Van field but greater in area, when S. J. Rotundi, F. R. Jackson et al's Cobb 1, situated on a five-acre lease near the center of the hamlet, cleaned itself with a steady flow on December 29. The well later gauged 365 barrels of 29-gravity brown oil on three-hour test through tubing chokes. Production is from six layers of sand aggregating 87 feet according to electrical formation survey between 4518 and 4630 feet. The well was drilled to 4648 feet with an elevation of 400 feet and 5½-inch pipe is cemented at 4507 feet. Base of the Austin chalk was called at 4191 feet and top of Woodbine series at 4398 feet. On the latter marker it is 368 feet higher subsea than the discovery pumper which produced 125 barrels of oil plus considerable water after perforating pipe at 4909-16 feet.

Bobby Manziel et al's Bell 1, located 2.7 miles south of his pumper and a mile west by north of the townsite well blew out December 29 at 4363 feet with 2300 feet of drill pipe in the hole. The gas flow was rated at 15 to 20 million feet daily and remained out of control because of 100 feet of surface pipe being inadequate to retain the pressure. Bell 1 logged top of Austin chalk by samples between 4214-41 feet with an elevation of 425 feet and last sample check at 4339 feet was pronounced sub-Clarksville. The latter zone yielded a few small wells at Van and also in the now depleted Camp Hill pool, Anderson County.

Hawkins crude is of asphalt base and somewhat similar to that produced from the Woodbine at Cayuga. This grade of oil is in demand but the price is comparatively lower than the average paid for Woodbine oil with the Talco field setting the price level. Crude from the Sulphur Bluff and Talco fields, both Paluxy-sand areas, is routed via Humble Pipe Line Company's system to Longview section of the East Texas field thence to Louisiana and Port Arthur refineries. Humble Pipe Line Company is slated to be the first to enter Hawkins with a trunk line, as Humble Oil & Refining Company controls the bulk of the prospective producing acreage. The Texas Pipe Line Company is also a prospect.

More than a dozen rotary rigs are due to be in service at Hawkins before the end of the month and the expansion of the drilling program is largely dependent upon the well density permitted on the numerous town lots and small tracts acquired by independents. In addition to townsite tests being started by C. W. Johnson, Hollandsworth Drilling Company, and Roger Lacy, a number of outlying projects have been authorized. William Goldston contracted to start a test prior to January 24 on Sun Oil Company's Osborne 95-acre short-term lease, H. S. Cobb Survey, 6500 feet south of the townsite well with the latter retaining one-eighth over-riding royalty. This tract is 1¼ miles west of Alex Snyder et al's Holmes 1, abandoned in December, 1934, after logging Woodbine section at 5135-5330 feet with an elevation of 338 feet. This old failure places a sharp dip in the structure to the southwest of the townsite.

A field camp is to be erected at Hawkins immediately by Humble Oil & Refining Company in expectation of a drilling program that will be its largest during 1941 and to continue over a period of years.

Limestone County

Two Trinity prospects in a Limestone County proved disappointing on initial tests. Gulf Oil Corporation and Farrell Drilling Company's Beville 1, Horn Hill area, tested salt water after perforating 7-inch casing at 4932-40 feet opposite Travis Peak saturation, and has moved in string of 3-inch drill pipe to deepen, possibly to the Smackover lime. The Pettit zone, topped at 4737 feet with an elevation of 506 feet, has not been tested, although it is credited with having carried saturation and porosity. Harden & Amos' Hammond 1, three miles northwest of Kosse, was awaiting swabbing test after reperforating at 5776-5810 feet opposite Pettit zone. A small show of oil and gas was reported after previously acidizing through perforations at 5698-5740 feet.

Gulf Oil Corporation's Venters 1, west offset to the Pittsburgh deep wildcat producers in Camp County, logged top of Travis Peak sand at 7937 feet, with an elevation of 385 feet, and formation samples carried favorable oil and gas showings at intervals in drilling to 7980 feet.

Texas Permits

Permits for drilling 75 wells were approved last week by the Texas Railroad Commission, 148 less than were authorized the week before.

Operators in the East Texas field were permitted to drill 52 wells, with 37 in Gregg, 14 in Rusk and 1 in Upshur County, while two locations were reported from the remainder of the East Central Texas area.

The commission authorized 12 wells in Southwest Texas, three in the Panhandle and three in North Texas. One permit was reported from West Central Texas in Eastland County, and two from the Gulf Coast area. No permits were granted in West Texas.

Southwest Texas

Coloma Creek in Calhoun County Has Oligocene Show

The Lower Gulf Coast of Texas may be gaining a new Oligocene-sand oil field, this being the Coloma Creek structure in Calhoun County. After a squeeze job above and below the sand, perforations were made in a zone around 5885-5900 feet in McSpadden Company's Clark et al 1. A test was underway, but no details are available. Hole had been drilled to 6240 feet, finding a gas sand at 5786-98 feet and the oil sand at 5885-5900 feet. The operation is in the SW½ of a 1500-acre tract, Thomas Henessee survey and on a Coronado Corporation farmout. The 5000-acre block was assembled by McSpadden Company. Coronado Corporation, Transwestern Oil Company, A. H. Garner, Tideman & Franklin, the contractors, and Sun Oil Company, hold acreage. The test is one mile northeast of Hiawatha Oil & Gas Company's Roemer Estate 1, which had several oil showings.

In Aransas County, testing was being continued on Gulfboard Oil Corporation et al's State of Texas 1, Tract 239, near Mud Island in Aransas Bay. The test had first attempted completion through perforations at 9210-16 feet, but it was found that a squeeze job did not hold at 9126-32 feet. A new squeeze job was made in the upper hole and a test again was underway.

Humble Oil & Refining Company was drilling below 7885 feet in Egg 1, in the B. J. White League, 6½ miles northeast of LaWard, Jackson County. It apparently will be plugged back for tests up the hole after reaching 8000 feet.

S. E. W. Oil Corporation et al's Pfluger 2, Section 186, definitely opened a new producing level and extended the Agua Dulce field one mile southeast. It cored sands at 6976-80 feet and 6997-7018 feet, both new for the area, and was completed in the lower pay. It flowed several barrels of distillate, brown in color, and a large volume of gas through 7/32-inch choke under 2500 pounds tubing and 2750 pounds casing pressure.

In the Riverside field, northwestern Nueces County, Stanolind Oil & Gas Company's Thompson 2, 5139 feet northwest of production, flowed gas, distillate and salt water after plugging back from 7750 to 6982 feet. Exact perforations were not reported. The flow of fluid was under 1850 pounds on the tubing and 2150 pounds on the casing after being choked to 6/64-inch. The regular field pay, including several small oil wells and gas producers, is at 5000 feet.

Barnsdall Oil Company's Marberry 4 gauged 129 barrels of clean oil in 24 hours through ⅛-inch choke with 375 pounds pressure on the tubing and 950 pounds on the casing. Perforations had been made at 5621-33 feet. The well, in the Fagan survey, is 2569 feet west of Norsworthy Production Company's Fagan 1, producer in the same sand. Both wells are more than one mile south of the southermost production in the McFaddin field and are in Refugio County.

La Gloria field of Southern Jim Wells County was assured a 5910-foot east extension as LaGloria Operators Committee's Alby 1, Lot 2, Block 9, cored sand with distillate show. A 16-minute drill-stem test at 6152-75 feet recovered no fluid, 265 pounds pressure. It was fishing at 6484 feet at last reports.

Nichols pool of Hidalgo County was being given its second oil producer by a slight southeast extension to the field. Baldridge & King, contractors on the discovery well and now drilling an operation in their own right, had perforated casing at 3505-15 feet and were finishing Yturria Town & Improvement Company 1, NW Lot 9, Porcion 43. The test cored a sand at 3187-92 feet carrying salt water. This likely corresponds to the first gas sand in the field. A gas sand was found at 3481-91 feet and oil sand at 3505-21 feet, casing being set on bottom at 3521 feet. It is possible that the lower sand is a new lens for the pool and the zone at 3481 feet is the discovery pay.

Colorado Well in Wilcox

While the test is not final and several other zones may be tested before the producer is placed on regular production, W. R. Davis & Company's Brownson 1-A, at Garwood in Colorado County, was cleaning and flowing 3 barrels of fluid per hour, 40 percent high-gravity dark oil from perforations in Wilcox at 9423-35 feet. Flow was through a ⅛-inch choke, working pressure standing at 2000 pounds. Hole had been carried to 10,012 feet and casing landed at 9906 feet; perforated at 9423-35 feet.

This well is in the SE portion of a 355-acre tract in E. S. Woodley Survey, 2 miles south and west of the McLane gas-distillate producers in the Cockfield and Frio sands. It is about the same distance from a previously drilled Wilcox-sand test in which W. R. Davis & Company found a series of sands with gas and distillate showings.

At Vienna in Lavaca County, McMurrey Refining Company was preparing to drill plugs and perforate casing in the possible discovery of a new Wilcox sand field. The test cored a crude sand at 8491-8506 feet, which is believed to have had sufficient saturation to assure a producer. Several other sands were found in the Wilcox zone topped at 8413 feet. The hole is bottomed at 8523 feet with casing landed on bottom.

A discovery, which will place Dimmitt in the list of producing counties of South Texas, is apparent with preparations being made for completion of Producers Corporation et al's McKnight & Bennett 1, 5 miles west of Carrizo Springs. The well is in the Olmos section of the Navarro series, being bottomed in 3½ feet of clean fine-grained oil sand at 2298 feet. The casing was landed at 2294 feet. This wildcat gained attention when it cored a sand at 1698-1707 feet several weeks ago and a drill-stem test showed gas under 200 pounds working pressure in 19 minutes. Another sand cored just below 2200 feet developed salt water and oil show on drill-stem test. This sand was 18 feet thick. The latest sand was cored only 3½ feet, the hole being stopped in oil sand. This zone is expected to be at least 35 feet thick, this based on a core series of the same zone in an abandoned test 4500 feet west.

The show is of importance, as it paves the way to another trend of development through this dead spot of Southwest Texas. Last year, Wilcox production was found northeast of Cotulla in LaSalle County; the Dimmitt County discovery spreads the play over a vast area.

The potential producer is on a local structure at the edge of the Chittim anticline. Its successful completion, therefore, would turn attention to the drilling of other such highs on the main structure.

Charamousca shallow Mirando sand field in Duval County was expanded one mile southwest with completion of Magnolia Petroleum Company's Duval Ranch 10, Section 290. The well flowed 180 barrels of 20-gravity oil with no water per day through ⅜-inch choke, using four flow collars. Pressures were 230 pounds on tubing and 450 pounds on casing, flowing, and 500 pounds shut in. Gas/oil ratio was 500-1. The well was immediately offset to the north and a producer of like proportions was being completed as the week closed.

The discovery is looked upon with considerable interest as the Charamousca area was considered defined. The new well will lead to a material expansion of drilling.

Texas Gulf Coast

Chocolate Bayou May Have New Pay; Discoveries Up

The week's activities brought to a close a year of barely moderate activity in the upper Texas coastal sector. Discoveries exceeded those of 1939, 14 new fields being found, against 10 discoveries in 1939. Most significant feature of the 1940 discovery roster is the fact that seven of the 14 new fields were distillate producers, two were dry gas, five were oil fields. Of the distillate fields, Richardson (Ogburn), Harris County; Rowan, Brazoria County; Red Fish Reef, Galveston Bay, and possibly Blessing, Matagorda County, promise the greatest effect on market supply. Among the oil fields, Alta Loma, spectacular Galveston County strike, and Dyersdale, 4000-foot premium crude field in the Houston area, have made the only real bid for prominence. Two gas fields, Mt. Houston, Harris County, and Lissie, Wharton County, have only nominal importance.

New sand discoveries were made at Fannett, Green's Lake, LaBelle, Angleton, Old Ocean, Esperson and Pickett Ridge, among the old fields, and Rowan, Richardson and Red Fish Reef among the 1940 discoveries, with none receiv-

ing the development necessary for estimates of importance.

Completions during 1940 totaled 1185, off 8.2 percent from the 1939 figure. Wildcat activity was rarely near peak levels and dwindled at the end of the year to a few scattered operations. Wilcox exploration, consistent throughout the year, resulted only in increased knowledge of the complexities of that formation, and one field, Shepherd, in San Jacinto County. Galveston and Trinity Bay marine campaigns yielded two fields, Fishers Reef, oil, and Red Fish Reef, distillate and oil, in a race to obtain production on state leases and avert surrender in 1941-42.

Phillips Petroleum Company led the week's news with an apparent new sand discovery at Chocolate Bayou, Brazoria County. Houston Farms Development Company 1, Perry & Austin Survey, Abstract 110, flowed gas and from one to four barrels of distillate hourly through ⅛-inch choke from 9675-77 feet. Tubing pressure was 1500 pounds, casing pressure 3000 pounds. The test, 1½ miles west of Andrau 1, deepest producer in Texas, was perforated previously at 9690-93 feet, making only gas. The company's Triangle Development Company 1, a mile east of Andrau 1, was preparing to sidetrack past drill pipe stuck at 11,519 feet, with top of plug at 9900 feet.

Strake Petroleum Corporation's Griffith 1, Cayce Survey, Brazoria County, 3 miles southwest of Alta Loma field, Galveston County, drilled into a gas sand in the Heterostegina, topped near 8000 feet and verged on a blowout for several hours. Mud weight was reduced from 10 to 9.1 pounds in one hour. Weighted mud averted the danger, and drilling was resumed. The wildcat is reported checking from 50 to 100 feet high on Alta Loma markers.

Sun Oil Company opened a sixth, and intermediate, sand for Green's Lake, Galveston County, gauging Hughes 11, S. White Survey, 1000 feet southwest of production for 216 barrels of 26-gravity crude daily via 3/16-inch choke, with tubing pressure a little over 100 pounds. At Alta Loma, same county, Stanolind Oil & Gas Company set 7-inch protection string at 9000 feet, well above the pay. This well was directional relief for Hulen 1, wildcat discovery, and then was plugged back and straightened.

At Redfish Reef, Galveston Bay, Humble Oil & Refining Company tested a 9127-32-foot Frio section in State 7-A-264, a mile southwest of the discovery, recovered salt water, squeezed, and was waiting on cement. Gulf Oil Corporation's State 1-R-224, offsetting the discovery on the north, drilled out of 7-inch casing set at 9500 feet. Humble Oil & Refining Company's State 8-A was drilling at 9681 feet; State 9-A at 9848 feet, and State 10-A at 4710 feet.

Pan American Production Company abandoned Fontenot 5, northeast outpost in the southern sector of the South China field, Jefferson County, at 7950 feet, after 20-minute drill-stem test at 7940 feet recovered 4000 feet of salt water.

John Mayo and George Echols got underway on Hardison 1, interesting Yegua test of the Cypress prospect, northwestern Harris County. Location is in J. W. Moody Survey, a mile northeast of Gulf Oil Corporation's Roberts 1, dry hole, and two miles northeast of Mayo's Josey 1, another failure. The Gulf Oil Corporation test recovered salt water and trace of distillate on drill-stem test at 6930-20 feet.

May Build Line to Joaquin Gas Field

Southern Natural Gas Company, Birmingham, Alabama, which through a subsidiary, Southern Production Company, recently acquired large holdings around the Joaquin, Texas, gas field in Shelby County and DeSoto Parish, Louisiana, plans to lay a gas line from this field to Monroe, Louisiana, if and when gas production at Joaquin warrants it.

Louisiana Gulf Coast

Year's Work Provides 16 New Fields and 37 Sands

Coastal Louisiana rounded out a successful year with both field and wildcat activity at a high level, but with only routine developments during the last week. Discoveries during the year totalled 16 new fields, and 37 additional sands in both old fields and 1940 discoveries. Completions for 1940 were 1047, an excess of 21.2 percent over 1939. The success ratio for 1940 was also notably higher than that of 1939, the 768 oil wells and 17 gas wells constituting 75 percent of all completions, while only 68.7 percent of the 1939 completions were similarly successful. The national deep-drilling crown, held during 1938 and 1939, appeared secure for 1940, as average drilled depth of all completions jumped from 6395 feet in 1939 to 6898 feet in 1940; all completions accounting for 7,222,990 feet of hole.

Cursory examination of the 1940 discoveries reveals that few hold major possibilities apparent at present, that most of them defy classification because of slow development, while another small group can be expected to make only a nominal addition to reserves. The 1940 discovery most likely to be a major production factor is Atlantic Refining Company's Neale field (Wilcox), Beauregard Parish, while Lake Salvador, The Texas Company strike in St. Charles Parish, the company's West Cote Blanche field, St. Mary Parish, Gulf Refining Company's West Bay discovery, Plaquemines Parish, and Plymouth Oil Company's Bayou Pigeon strike, Iberia Parish, have a clear history and an unclouded future. Bayou Des Glaise, Bayou Perot, East Tepetate, Erath, Petit Chenier, Schooner Bayou, Section 28 Dome, South China, and West Mermentau are difficult to classify. Undistinguished are Erath, South Crowley and Stella, the latter two plagued by salt water. The Texas Company took the discovery honors with three fields, Lake Salvador, Erath and West Cote Blanche. Humble Oil and Refining Company found two fields, South Crowley and Bayou Des Glease, while other discoveries were scattered among 11 companies.

Magnolia Petroleum Company's discovery and development of the 8200-foot horizon at Iowa, Calcasieu and Jefferson Davis parishes, led the new sand discoveries in general interest. Six of the 1940 field discoveries now produce from two or more sands.

In the Westwego area, Jefferson Parish, Titantic Oil Company drilled past 9000 feet in side-tracked hole in Marrero Land Company 1, Section 2-13s-23e, farmout from Shell Oil Company near the approach to Huey P. Long bridge. Reese Carter staked Fee 1, ¼-mile east in Section 3-13s-23e. This area has been regarded as a certainty for production since Titantic Oil Company's test blew out from 9843 feet, making 35.1-gravity oil under 3300 pounds pressure. Operators cemented in stuck drill pipe with intention of completing through drill string. However, the state forbade this expedient, forcing a side-tracking job which has been six weeks underway and is still 800 feet above the sand. Test through opened pipe shortly after the blowout indicated that the well would produce 450 barrels daily. Leases in the area are in demand, with Shell Oil Company expanding its acreage, Phillips Petroleum Company entering the play, and independent operators buying in. Shell Oil Company, Gulf Refining Company, and Stanolind Oil & Gas Company, blockholders, contributed $27,000 toward drilling Marrero 1. The structure is a reflection prospect found by Shell Oil Company in 1938-39.

200 Producing Acres Sold

One of the largest land deals of the year was Glassell Drilling Company's sale of 200 producing acres, bearing 16 oil wells, in the Jennings field, Acadia Parish, to the D. Feldman interests. All Glassell equipment was included in the sale, in which consideration was reportedly $1,200,000.

Superior Oil Company was swabbing at 7485-7500 feet in St. Martin Land Company 1-A, 2 miles south of shallow production at Bayou Bouillion, St. Martin Parish, and was expected to open a gas-distillate level, basing the expectation on cores taken from that section. At last report, flow had not started, with fluid level 1000 feet. The company's St. Martin Land Company 1-B, offsetting Stuart 1, recent discovery on the Section 28 Dome, St. Martin Parish, was drilling at 400 feet.

Continental Oil Company and W. T. Burton abandoned Mayo Realty 1, South Lake Charles prospect, Cameron Parish, at 10,400 feet. The test, in Section 11-8s-11w, fifth for the seismograph prospect, led the news in November, when it blew gas and distillate out of control from 10,800 feet before sanding up. Continuous mechanical difficulties left the hole in poor condition, and it is probable that a new test will be announced soon.

More development for the South Jennings distillate field, Jefferson Davis Parish, became a strong prospect as Stanolind Oil & Gas Company announced plans for a $500,000 recycling plant, with approximate daily capacity of 30,000,000 cubic feet. Hearing will be held by the Conservation Department on January 9 to discuss the proposal. The field, shut in for the past two years, has three wells. No definite plans for

further development have been disclosed.

Crosby Drilling Company revealed a probable slight shift in the central fault pattern at Eola, Avoyelles Parish, coring 100 feet of oil sand in the Wilcox at 8300-8400 in Whitlow 1, Section 6-2s-3e, in the center of the field, offsetting a dry hole. This unusually large section indicates an upper Wilcox sand. Casing was run to bottom and preparations made to perforate.

Thirty-four drilling permits were issued last week by the Louisiana Conservation Commission. In North Louisiana, sixteen permits were divided among the following parishes: Bienville 1, Caddo 6, La Salle 8, and Grant 1.

The 18 in South Louisiana were divided among the following parishes: Avoyelles 1, Calcasieu 1, Cameron 1, East Baton Rouge 1, Evangeline 1, Iberia 5, Jefferson 1, Jefferson Davis 1, La Fourche 3, St. Landry 1, St. Martin 1, and West Baton Rouge 1.

North Louisiana

Geophysical and Leasing Continues at High Level

Although the holiday period brought a decline in drilling activity, leasing and geophysical activity in North Louisiana showed no recession. Although the center of leasing and geophysical activity continued in the trend just south of the Angelina-Caldwell Flexure where the Olla and Nebo (Jena) shallow Wilcox fields were found productive in 1940, there was a noticeable gain on the south and southeast flanks of the Sabine Uplift.

Indications point to resumption of an early drilling campaign by H. L. Hunt in the Bear Creek field, Bienville Parish, found productive of gas-distillate several years ago in the Glen Rose. Hunt has been adding acreage there recently.

In Catahoula Parish, Louark Producing Company, which has taken huge geophysical-option blocks recently in LaSalle and Winn parishes, took options on 12,500 acres in Township 8 north, Range 6 east. Gulf Refining Company, Louark Producing Company and H. L. Hunt have geophysical units in this parish.

In Grant Parish, where Gulf Refining Company, Arkansas Fuel Oil Company, Louark Producing Company, and Shell Oil Company have geophysical units, Gulf Refining Company has recently taken geophysical options on almost 50,000 acres of William Edenborn Estate land in Townships 6, 7 and 8 north, Ranges 3 and 4 west. In Natchitoches Parish, McSpadden et al' of Houston, took a 4000-acre block in Township 13 north, Ranges 7 and 8 west. Shell Oil Company secured geophysical option on 15,000 acres of Louisiana Long Leaf Lumber Company in Townships 4 and 5 north, Ranges 9 and 10 west, Sabine and Vernon parishes.

Fred Shields, of San Antonio, made tentative location for a 5500-foot wildcat test on a 2100-acre farmout from Continental Oil Company in SE SE NW 34-13n-12e, Tensas Parish. Union Sulphur Company and Arkansas Fuel Oil Company are securing leases in this area. T. J. Sandridge continued to lease in Township 10 north, Range 11 east of Tensas Parish, and in the same parish, Louark Producing Company secured 2000 acres in Township 14 north, Range 11 east. In Caldwell, Ouachita and Richland parishes, Sinclair Prairie Oil Company, which has been actively leasing in the trend, secured geophysical option on 20,000 acres of Tensas Delta Lumber Company acreage in Townships 13, 14 and 15 north, Ranges 5 and 6 east. H. L. Hunt has a geophysical unit working in Madison and Tensas parishes, in Townships 14 and 15 north, Ranges 12 and 13 east. Louark Producing Company has geophysical units working in Township 11 north, Ranges 1 and 2 west, Winn Parish.

Union Producing Company was arranging to core deeper in Smackover lime at 10,403 feet in Meadows A-1, C NE 18-21n-4w, Claiborne Parish, 2½ miles north of Lisbon, after setting 7-inch casing at 10,393 feet. Cores probably will be taken some distance into the Smackover lime, topped at 10,270 feet (elevation 241 feet). Unless better showings are encountered, hole will be plugged back and a gas showing 10,393-403 feet will be tested. It is the most important showing ever logged in Smackover lime in North Louisiana, where deepest production at present is from lower Marine.

Arkansas

Third Smackover Distillate Well Finaled at McKamie

Completion of the third 9000-foot Smackover lime gas/distillate well last week in the McKamie field, LaFayette County, Arkansas, resulted in staking three new locations in that field, the newest field in South Arkansas, discovered in 1940.

Normandie Oil Company's Cornelius 1, NW SW 28-17-23, was completed at 9366 feet, flowing 12 barrels of straw-colored distillate per hour through 12/64-inch choke, with casing pressure 3000 pounds and tubing pressure 2600 pounds. Gas/oil ratio was 8000/1. Production was approximately 59-gravity. Casing was perforated at 9285-93 feet, and the well extended production ½ mile east.

New locations staked were Barnsdall Oil Company's Cornelius 1, C SW NW 28-17-23, a north offset to the new well, and Atlantic Refining Company's Bodcaw Lumber Company 3 and 4, located respectively in C NE SE 29-17-23 and C SW NW 29-17-23. Atlantic Refining Company discovered this field, a geophysical prospect, and owns the first two gas/distillate producers.

Two more Smackover deep-lime prospects were in the offing for the start of 1941. Lion Oil Refining Company, with an 80 percent interest; Marine Oil Company, and C. H. Murphy have pooled

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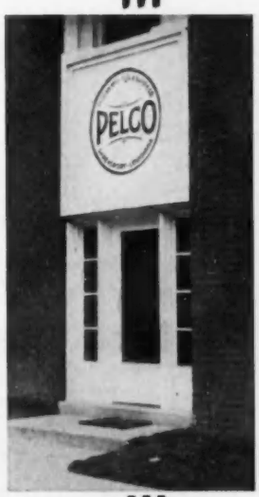

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interests for a deep test in the old Shallow Smackover field, in or near Section 31-16-16. In the Macedonia wildcat area of Columbia County, McAlester Fuel Company (J. G. Puterbaugh) plans a cooperative deep test in SE SE 15-18-21. Crescent Drilling Company continues to get cooperation for a proposed Smackover lime test in Section 13-18-17.

E. G. Bradham et al's A. E. Slaughter 1, SE SE 9-17-16, a deep test in the old Lisbon, Arkansas, field, Union County, discovered as a Nacatoch shallow oil field, tested salt water in Smackover lime, topped at 6722 feet, and was shut down at 6821 feet. It was the first Smackover lime test in this old shallow area.

Arkansas Permits

One drilling permit was issued last week by the Arkansas Oil & Gas Commission. Franklin County—Ozark Natural Gas Company's Henry Ramsey 2, SEc NE 31-10n-26w.

Southeastern States

Hinds County Wildcat Among Week's New Starts

Activity, already at a low ebb in Mississippi, was particularly quiet last week. One new wildcat location, Hassie Hunt's W. A. Montgomery 1, NW SW 12-5n-4w, on a 6000-acre Hinds County block, was staked and rigging started.

City of Jackson's Fee 2, NE SE NE 34-6n-1e, in the Hinds County part of the Jackson shallow gas field, and located near Bailey Junior High School in the city limits, was dry at 2547 feet in Midway chalk. With elevation of 381 feet, it topped Wilcox at 1140 feet, and Midway at 2441 feet. Black shale was at 2535-41 feet, with three feet of hard lime immediately underneath. Broken lime was logged at 2544-46 feet, and the next two feet was soft chalk.

Two new oil producers were completed in the Tinsley Dome field, Yazoo County. One new location was made by Union Producing Company, discoverer of the field. During 1940, Union Producing Company completed 60 wells at Tinsley Dome, of which only two were dry, the others being oil producers. In all fields, this company completed 83 wells with only three dry holes, two at Tinsley Dome and a wildcat abandonment in Choctaw County, Alabama. The company in all fields completed 19 gas producers.

Michigan

Wildcat Flows 80 Barrels Daily from 7776 Feet

As Michigan closed its second consecutive year without a major new-field discovery, interest on deep formations hit a new high at year-end when Gulf Refining Company's Bateson 1, Section 2-14n-4e, Bay County, the state's deepest test at 7776 feet, showed an average recovery the first five days on test of 80 barrels per day of 71.3-gravity oil.

Tests were started on December 26, with the well flowing between 3,850,000 and 4,150,000 feet of gas through a ¼-inch choke and with from 1200 to 1600 pounds casing back pressure. First 17 hours, well recovered 79 barrels and the next four consecutive 24-hour periods it recovered, 83, 78, 84 and 80 barrels. The stripped oil was first reported as 56-gravity, but a later analysis showed 71.3 at 30 pounds vapor pressure, with a boiling point over 700 degrees. Laboratory reports for paraffin and sulphur content had not been announced, although a strong sulphur odor was evident. No analysis was available to permit comparison of the crude to distillate wells in the Southwest.

The oil apparently had started to come in after the deep well blew out and fired December 5 as it was not reported in original analysis of the gas. It increased interest on the possibility that at 7776 feet, where the blowout developed, the bit had entered top of the Niagara limestone. No samples were recovered the last six feet drilled, with the sample at 7770 feet still showing Salina salt. Bay Refining Company contracted to purchase the deep-pay oil, at least temporarily, and run a line from storage tanks to a road from which the oil will be moved by truck to the company's plant five miles away. A price of $1.40, 22 cents higher than the top posting for any other Michigan crude, was tentatively set.

Officials indicated that establishing pay at 7776 feet in a horizon which has the industry slightly confused at the moment, would not bring any immediate revision in original plans to carry the well to 9000 feet or more. New derrick has been completed, and a new rotary is to be set this week.

New development in Winfield Township, Montcalm County, was forecast when Daily Crude Oil Company's Weatherby 3, SW SE SE 20-12n-9w, flowed 100 barrels first 12 hours and 135 barrels next 24 hours from Monroe lime at 3356 feet. Top was logged at 3303 feet. The company drilled Weatherby 1, 1320 feet west of No. 3, for a discovery in the same zone three years ago. It initialed 40 barrels after acid. Subsequent development in all directions, excepting east, resulted in failures. The company controls, either directly or through Sun Oil Company farmouts, the bulk of possible productive acreage.

Sun Oil Company's McIntosh 1, C S½ SW NE 16-19n-3w, Hamilton Township wildcat, Clare County, checked Dundee at 3818 feet and was abandoned at 3915 feet for the sixth consecutive failure in the horizon this year. The area developed a play when the company's McKenna 1, about 1¼ miles southeast of the McIntosh test, started off at 1500 barrels a day natural early in the year. Production quickly fell, and last month it was abandoned.

A potential ½-mile west extension to the old Adams field, Arenac County, was developed by Boswell & Blackmer on Cousins 1, SW SE NE 27-19n-3e, which was estimated a 75-barrel producer natural at 2093 feet in the Traverse lime.

Burks White, of Mt. Pleasant, and Hassie Hunt, of Jackson, Mississippi, moved in cable-tool rig on Ball 1, Section 29-14n-4w, Union Township, Isabella County, two miles southwest of Mt. Pleasant's city limits, for a 3700-foot Dundee test.

Drilling was resumed on Wallace Markle's Johnston 1, Section 8-17n-14e, Huron County, a test shut down since last April at 3253 feet. It will be carried about 400 feet deeper to test the Sylvania sand.

New Mexico

Maljamar Field Activity South of Discovery Sector

Authorization of four new tests for the Maljamar field, oldest producing area in Lea County, New Mexico, involves the expansion of operations along the south edge of the discovery sector. Although the field was opened in 1926, development did not attain important proportions until the last half of 1940. This deferred drilling program resulted from assignment of a large portion of the discovery block to independents with adequate financial backing, and the entry of a major pipe-line company as a supplemental outlet for the high-gravity crude.

Currently, the Maljamar field has 17 tests drilling and in process of completion, representing more than one-fourth of the field work underway in the state. Maljamar Oil & Gas Corporation, discoverer, Carper Drilling Company and Barney Cockburn are the largest lease owners and likewise the most active units. The latter has completed 28 wells since July, 1939, and has nine operations on virtually proved locations, including four new tests on the Pearsall permit, which was recently acquired from Paul Love et al. Expansion of the field southeast is a late development, involving Fair & Pope's Johns 1, C NW SE 26-17s-32e, which flowed 42 barrels oil the first hour after nitro shot at 4275 feet.

Amerada Petroleum Corporation's State 1-A-J, NE SE NW 27-26s-37e, offsetting production in the south portion of the Rhodes pool, Lea County, flowed 259 barrels of oil in 18 hours on potential gauge through ½-inch tubing choke after nitro shot in broken lime at 3175-3279 feet. A new operation for the area involves The Texas Company's Moberly 2-C, C NE SE 21-26s-37e, offsetting an outpost producer.

Development of the Vacuum field was temporarily concluded with completion of The Texas Company's State 3-AC, C NE SW 2-18s-34e, flowing 130 barrels oil natural on 18-hour gauge from pay at 4520-4710 feet, with gas/oil ratio of 376/1. Trend of production in the Vacuum field is open to the south along a 3-mile front, and 1941 activity will be confined to this sector with The Texas Company in control of the bulk of the acreage.

Rocky Mountain Area

Dakota Pay in Rock River Defined; Test Plugs Back

The Ohio Oil Company's Lundy 2, SE NE NW 34-20n-78w, defined the Dakota pay of the Rock River field, Carbon County, Wyoming. The test, ⅜-mile from production, developed water in the Dakota at 4210 feet, and has been plugged back to 4096 feet to perforate the 7-inch string for a test of the First Muddy sand, topped at 4026 feet.

In the Lance Creek field, Niobrara County, Wyoming, The Ohio Oil Company was building rig for Carrie Putnam 18, NW 4-35-65w. It will seek completion in the deep Leo sands.

On test, Continental Oil Company's Tom Bell 22, CSW NE NE 34-36n-65w, on the east side of the Leo area, flowed 7 barrels per hour from 5326 feet. Continental Oil Company's Tom Bell 23, CSE NW SW 34-36n-65w, another Leo east-end test, plugged back to 5359 from 5486 feet, and was shot with 40 quarts of nitro. It flowed and swabbed 71 barrels in 8 hours ,and was continuing to clean out and test.

Minnelusa Oil Corporation's Joss 4, CSW NE SW 6-35n-65w, outside location and ¼-mile extension test on the west side of Lance Creek, was drilling plug on the 7-inch production string set at 5299 feet, on top the Leo at 5396 feet.

Recent discovery of gas on the Vermillion Creek structure, Sweetwater County, southwest Wyoming, recompleted for a substantial gas increase with deepening. The well, Vermillion Oil Company's Amelia Horrocks 1, SW SW SW 7-12n-99w, flowed 8,600,000 feet initial after deepening from 3504 to 3540 feet. It made 2,500,000 feet from the Upper Wasatch level.

California

Fresno County Wildcat Coring Below 7150 Feet

Jergins Oil Company was coring below 7150 feet in Cheney Ranch 2, Section 20-14-13, Fresno County, in Cretaceous shale. Gray sand showing gas was cored at 6740-7073 feet. Two formation tests were run, unsuccessful due to failure of packer. Top of Kreyenhagen was cored at 3545 feet, top of Domengine at 4536 feet. Showings have not been as encouraging as those in the company's Cheney Ranch 1, abandoned earlier this year after failing to make a commercial producer.

Independent Exploration Company may abandon Unit Plan 1, wildcat in Section 19-7-6, Elk Grove area, Sacramento County. Bottomed at 4810 feet, formation test at 2380-2450 feet failed to recover commercial showings and well was standing suspended. Formation test at 4780-4806 feet resulted in salt water and mud with faint blow of gas.

Hancock Oil Company's Roberts 1, wildcat in Section 6-30-28, Union Avenue area of Kern County, was being cored below 5466 feet in shale, oil sand and gray sand. Plans call for coring all the Santa Margarita before plugging back to test upper showings by states. Gassy sand was cored from 4200-4300 feet, oil sand at 4970-5100 feet, with streaks of gray sand and siltstone.

A survey of geophysical exploration activity shows only 13 parties active, as compared with 33 eighteen months ago. At present, geophysical crews are busy north of Seal Beach in the Los Angeles Basin; northwest of Lost Hills, east of Lost Hills, west of Greeley, west of Fruitvale, and near Devils Den and Grapevine, all in Kern County; while additional crews are active in the northerly areas near Hanford, Rio Vista, Oakland Bay, Tipton and in South Madera County. Crews have also been active recently in the Tulare Lake basin, and in areas in northwestern Fresno County.

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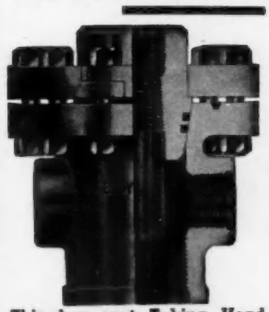

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UNITED STATES WELL COMPLETIONS

ARKANSAS

Company, Well and Location	Init. Prod. Bbls.	Depth
La Fayette County (McKamie)—		
Normandie Oil Corp., Cornelius 1, 28-17-23	300	9366
Union County (Urbana)—		
Marine Oil Co., Thompson A-3, 3-18-13	235	3055

CALIFORNIA

Company, Well and Location	Init. Prod. Bbls.	Depth
Fresno County (East Coalinga Eocene)—		
Standard, 44-19F	222	7822
Fresno County (Kettleman Hills)—		
Standard, 344-13H	75	10873
Kern County (Devils Den)—		
Raymond D. Herzog, Marine 28	18	141
Kern County (Belridge)—		
Belridge Oil Co., No. 49-35	no est.	8080
Kern County (Canal)—		
Ohio Oil, KCL E-21	122	8248
Kern County (Coles Levee)—		
Ohio Oil, KCL F-12- 27-2	575	9885
Richfield, KCL-B 18-27	1248	9509
Kern County (Greeley)—		
Standard, KCL 12-11	3370	11510
Kern County (Lost Hills)—		
Texas Co., Theta 2-28	12	1301
Kern County (Ten Sections)—		
Shell, KCL A-45-29	353	8235
KCL A-85-29	2219	8220
KCL A-65-30	1533	8210
Los Angeles County (Long Beach)—		
Texas Co., Harlow-Kent 17	357	2933
Los Angeles County— (West Montebello)		
Kern Oil Co., Monterey 12	63	3770
Los Angeles County (Potrero)—		
Turf Oil Co., Turf Club 2	220	5804
Los Angeles County (Rosecrans-Athens)—		
L. C. and M. V. Kelly, McMillen 5	180	7882
Los Angeles County (Wilmington)—		
Petroleum Midway Co., Kupfer G-2	100	3591
Sound Petroleum Co., No. 2	190	3100
Union Pacific, UP 157	445	3965
Orange County (Huntington Beach)—		
Signal O&G Co., Signal-Bolsa 16A	239	5060
Termo Co., Fee 3	180	5255
Ventura County (Ventura Avenue)—		
Shell, Taylor 128	3254	7950
Tide Water, McGonigle 20	1500	8210

*Failures; †Junked; ¶Million cu. ft. gas.

Kansas

Company, Well and Location	Init. Prod. Bbls.	Depth
Barton County—		
Sharon, Luerman 3, cn½ ne se 18-16-13w (OTD 3392)	150	3390
Stanolind, Ehrlich 1, ce½ ne ne 14-16-14w	*	3407
Owens et al, Burmeister 1, cs½ se nw 20-17-11w	*	3466
Texas, Burmeister "A" 3, ce½ ne se 2-17-11w	sw dis	3394
Disque 7, nw ne sw 3-17-11w	3000	3298
I. T. I. O., Burchart 4, cs½ nw ne 14-20-11w	*	3333
Champlin, Clawson 3, cs½ ne nw 17-20-11w	1722	3330
Virginia, Clawson 2, cn½ sw nw 17-20-11w	3000	3302
Butler County—		
Cities Service, Moyle 345, sec sw 11-28-4e	55	2104
L. & M. Oil Co., Creed 2, sw se se 17-29-4e	25	1887
Ellis County—		
Cities Service, McCord 6, nwc se 26-11-17w (OTD 3564)	3000	3583
Hall, Smith 10, ce½ nw ne 14-12-16w	2690	3216
Central, Wellbrock 1, nwc ne 32-14-16w	*	3452
Ellsworth County—		
Magnolia, Haska 3, ce½ sw sw 5-16-10w	1159	3267
Schroeder 4, cw½ se sw 26-16-10w	3000	3316
Cities Service et al, Mehl 4, cw½ sw ne 19-17-9w	3000	3235
Sinclair Prairie, McKee 24, sw se ne nw 32-23-10e	12	2316
Progressive, Loose 1, c nw ne 22-26-8e	35	2005
McPherson County—		
Stelbar, Bethany College 1, ce½ nw se 19-17-1w	258	2695
Republic, Johnson 3, cw½ sw nw 19-20-5w	1876	3350
Transwestern, Nelson 3, cw½ ne ne 19-20-5w	3000	3354
Morris County—		
Hutchinson O.&G. Co., McCoy 1, cw½ nw sw 29-17-5e	*	2525
Pratt County—		
Skelly, South Maxedon 4, ce½ se se 25-27-11w	511	3480
Rice County—		
McPherson, Cramm "E" 1, sw nw se 15-19-9w	365	3228
Hess et al, Cole 1, sec ne 31-20-6w	*	3481
Bay, Keesling 1, cs½ se sw 3-20-9w	450	3224
Mid-Plains, Hauschild 5, cs½ se ne 15-21-7w	*	3414
Russell County—		
Stanolind, Mervis "A" 4, ne nw se 32-13-15w (OTD 3326½)	84	3140
Skelly, Colliver 8, cs½ ne se 28-14-13w	1666	2890
Hickey 2, cs½ nw nw 30-14-13w	1484	2906
Anderson 2, cs½ se ne 7-15-13w	475	3042
Stanolind, Rosener 11, cs½ se se 9-15-13w (PB 3110)	349	3361
Stafford County—		
Zephyr, Moon 1, cs½ se nw 30-22-13w	*	3926
British American, Meyer 1, nwc ne 28-23-12w	3000	3835
Cities Service, Heyen 2, se ne nw 28-23-12w	3000	3851
Landon et al, Volker 1, cs½ sw sw 1-24-11w (PB 3734)	778	3765
Bay, McNickle 1, cs½ se se 2-24-11w	3000	3760
Atlantic et al, McNaughten 3B, csl se nw nw 27-24-13w	3000	4064

Kentucky

Company, Well and Location	Init. Prod. Bbls.	Depth
Daviess County—		
Ankeny & Gibson, Church 5, sw nw sw nw 15-N-31	90	1059
McLean County—		
South Penn Oil, Nall 12, nw nec 22-L-28	*	1466
Ohio, McManama 5, nw nwc ne 4-M-28	¶	1681
Ohio County—		
DeHart & Hunt, Bartlett 7, se nw se 6-M-32	*	546
Glove, Kelly 6, nw nw sw se 6-N-33	*	873
Grewe & Schmide, Whittinghill 1, nw nw se sw 17-N-35	*	610

South Louisiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Anse La Butte—		
Williams & Debusse, Deborah 1	*	1747
Chalkley—		
Humble, Hanszen 12	*	8473
Edgerley—		
Emerson, Hunter 16	195	3207
Iowa—		
Shell, Fontenot 4, otd 6926	905	8300

Summary of Drilling Operations in the United States, Week Ended January 4, 1941

	WELLS COMPLETED							PERMITS FOR NEW WELLS				
	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total 1941	Total This Date 1940	This Week	Total This Month	Total 1941	Total This Date 1940	Year Total 1940
Alabama	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas	2	2	.....	.....	535	2	11	1	1	1	3	153
California	23	23	.....	.....	16,475	23	34	12	12	12	32	1,102
Colorado	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Florida	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Georgia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois	.....	.....	.....	.....	.....	.....	128	90	90	90	125	4,532
Indiana	.....	.....	.....	.....	.....	.....	20	.....	.....	.....	.....	.....
Iowa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kansas	38	30	.....	8	58,894	38	66	24	24	24	47	2,048
Kentucky	6	1	1	4	90	6	22	.....	.....	.....	.....	.....
Louisiana	19	16	.....	3	4,170	19	71	11	11	11	74	1,658
Michigan	18	9	1	8	1,095	18	63	18	18	18	69	1,093
Mississippi	3	2	.....	1	715	3	5	.....	.....	.....	.....	.....
Missouri	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	26
Montana	3	3	.....	.....	814	3	.....	.....	.....	.....	.....	.....
Nebraska	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	69
New Mexico	5	5	.....	.....	1,282	5	37	7	7	7	24	559
New York†	8	8	.....	.....	13	8	43	.....	.....	.....	.....	.....
North Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio	.....	.....	.....	.....	.....	.....	37	.....	.....	.....	.....	.....
Oklahoma	42	31	2	9	14,750	42	84	33	33	33	42	1,888
Pennsylvania	16	14	2	.....	3	16	137	.....	.....	.....	.....	.....
South Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee	.....	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....
Texas	84	60	3	21	41,632	84	352	75	75	75	302	11,170
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia	.....	.....	.....	.....	.....	.....	18	.....	.....	.....	8	603
Wyoming	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total this week	267	204	9	54	140,518	267	1,113	271	271	271	652	24,902
Total last week	453	299	53	101	122,248	.....	.....	407	1,679	.....	.....	24,902
Total this year	267	204	9	54	140,518	.....	.....	.....	.....	271	.....	.....

† Includes water-input wells.

United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
South Louisiana—Continued		
Jennings—		
Imperial, Clement 6	60	5025
North Crowley—		
Humble, Williams 9	494	8606
Paradis—		
Luse & Adams, Pyregene 1	*	11350
Ville Platte—		
Continental, Deville 2, Unit 2	72	9029
Danciger, Vidrene 4	620	10145
North Louisiana		
Caddo Parish (Pine Island)—		
Gertrude McClenaghan, Handschumacher 3, 18-21n-15w	500	1635
E. E. Johnson, Stinson 1, 32-21n-15w	35	1521
S. Reele, Ramsey 1, 32-21n-15w	35	1597
W. E. Stewart et al, Forrester-Downer 1, 32-21n-15w	25	1523
Lloyd A. Farr, Goodwin 2, 33-21n-15w	125	1616
Claiborne Parish (Lisbon)—		
J. D. Carruthers et al, Simmons Unit 1, 2-20n-5w	175	9016
La Salle Parish (Jena-Nebo)—		
H. L. Hunt, Goodpine Lbr. Co. A-7, 9-7n-3e	390	3895
La Salle Parish (Olla)—		
Arkansas Fuel Oil, Goodpine Oil Co. C-2, 24-10n-2e	170	2231
Placid Oil Co., La. Cent. Lbr. Co. 52, 36-10n-2e	150	2427
La. Cent. Lbr. Co. 70, 30-10n-3e	220	2400
Michigan		
Allegan County—		
Robt. Lentz, Tr., Gun Club 1, sw sw nw 26-3n-15w	*	1421
Red-Man Oil Co., Busscher 1, ne sw nw 16-4n-14w	*	1535
H. C. William, Gordon 1, se sw sw 10-4n-13w	*	1669
Arenac County—		
Boswell & Blackmer, Cousins 1, sw se ne 27-19n-3e	75	2093
Bay County—		
L. C. MacGregor, Kircher 1, sw nw ne 2-14n-4e	15	2847
Clare County—		
Sun Oil, McIntosh 1, c s½ sw ne 16-19n-3w	*	3915
Midland County—		
Pure Oil, Naramore 37, c s½ sw sw 10-13n-1w	140	3398
Montcalm County—		
Daily Crude Oil Co., Weatherby 3, sw se se 20-12n-9w	135	3356
Ottawa County—		
Fisher-McCall Oil Co., Estman 1, nw ne sw 18-7n-14w	*	1972
Moss 1, sw nw ne 2-6n-13w	200	1782
Gordon Oil Co., Leavenworth 1, nw sw ne 2-6n-13w	35	1812
John C. Newell, Rapp 1, se se sw 23-7n-13w	60	1875
Swanson Cons., Lautenbach 2, sw sw sw 27-7n-13w	35	1796
West Mich. Consumer, Slaughter 1, c w½ 19-8n-13w	¶1.0	1298
Van Buren County—		
J. H. Fitchett, Stasak 2, se nw nw 7-1s-14w	400	1190
Clapsaddle & Harris, Remington 2, nw se sw 10-1s-14w	*	1279
Twin Dr. Co., Barringer 2, nw se ne 29-1s-16w	*	1019
Tomcala 1, se se se 24-2s-15w	*	1075
Mississippi		
Hinds County (Jackson)—		
City of Jackson, Fee 2, 34-6n-1e	*	2547
Yazoo County (Tinsley Dome)—		
Love Pet. Co., Germany Unit 1, 19-10n-2w	265	5003
Union Prod. Co., Harris 1, 30-10n-2w	450	5010
Montana		
Glacier County (Cut Bank)—		
Texas Co., Fee 6, cwl sw se 15-35n-5w	127	2917
Neill 2, cne nw 14-35n-6w	15	2976
State 9, cnw ne 16-32n-5w	672	3047
New Mexico		
Eddy County—		
C. B. Buck et al, Dodd 1-B, c nw se 11-17s-29e	54	2591
Lea County (Arrowhead)—		
Gulf, State-Leonard 2-D, nec ne 3-22s-36e	40	3845
Lea County (Eunice)—		
Cities Service, Closson 8-AA, c nw ne 18-22s-36e	670	3805
Lea County (Rhodes)—		
Amerada, State 1-A-J, ne se nw 27-26s-37e	345	3279
Lea County (Vacuum)—		
Texas Co., State 3-AC, c ne sw 2-18s-34e	173	4710
New York		
ALLEGANY COUNTY		
Friendship Oil Co., Richardson farm, Bolivar	5	1328
Short & Vossler, Quick farm, Alma	5	1562
Sloan & Zook, McDavitt farm, Bolivar	3	1410
Water Intake Wells		
Franchot Oil Co., Murphy farm, Bolivar	..	1474
Bradley Prod., Lewis farm, Alma	..	1572
Lewis farm, Alma	..	1550
L. H. Thornton et al, Fassett farm, Willing	..	1284
L. H. Richardson et al, Browning-Wright farm, Scio	..	971
Oklahoma		
Carter County—		
Jones Oil Co., McGill 2, sw ne sw se 17-4s-2w	2	2520
W. H. Smith, Ward 1, c n½ ne ne 19-4s-2w	93	2169
Batson, Williams 2, nw se ne 20-4s-2w (otd 1933)	116	1948
Gibson et al, Griffin 6, se se ne se 20-4s-2w	312	2193
Turner, Stearns 8, se se sw sw 21-4s-2w	75	2347
Ward 2, sw nw nw 28-4s-2w (otd 2251)	50	2385
Ward 4, ne sw nw nw 28-4s-2w	125	2395
Ward 5, sw ne nw 28-4s-2w	*	2492
Ward 6, ne nw sw nw 28-4s-2w	*	2355
Ward 8, ne ne nw nw 28-4s-2w	75	2280
Gibson et al, Lamb 3, se ne ne 29-4s-2w	130	2268
Creek County—		
Beal et al, Nemick 2, nw sw ne 16-14n-10e (otd 2708)	*	3382
Shell, Jones 1, nw sw nw 32-15n-7e	400	4099
Irvin Dr. Co., Bailey 1, se ne se 1-18n-9e	*	2321
Hughes County—		
Feagin, Fulks 1, ne nw sw 8-8n-11e	*	3017
Jackson County—		
Aloma, Robertson 4, sw ne se 15-1n-20w	65	1372
Kiowa County—		
I. T. I. O. Co., Halstead 1, ne se ne 17-6n-14w (Core hole)	*	2557
Lincoln County—		
Berkey, Gragg 3, se ne se 32-12n-6e	30	3309
Warren-Bradshaw, School Land 1, nec sw 16-13n-6e	¶14.2	4042
Logan County—		
Amerada et al, Fouts 1, nwc ne 14-17n-1w (otd 5191)	57	4980
Knight 1, swc 12-17n-1w (otd 5100)	7	4882
Marshall County—		
Pure, Little (100) 4, ne nw se 28-5s-7e	3104	4879
Little (101) 3, swc ne 28-5s-7e	1564	4893
Noble County—		
Skelly, Hanna 3, sw se sw 22-22n-2w (otd 4915)	*	3860
Okfuskee County—		
Droppleman, Dill "C" 5, nw ne se 34-12n-8e	2040	3587
Shell, Curry 4, ne sw nw 35-12n-8e	1756	3601
Oklahoma County—		
Skelly, Villa Park 1, se se ne sw 22-12n-3w (otd 6484)	209	6506
Okmulgee County—		
Morgan, Watson 1, c sw se 12-11n-13e	15	2321
Cole, Corbray 1-A, se se sw sw 16-14n-12e	*	2709
Cowan, Fields 1-B, se sw nw sw 3-14n-14e	5	1217
Mabee et al, Ashley 8, c n½ se ne 29-14n-14e	15	1245
Payne County—		
Blackwell et al, Collins 1, c e½ nw nw 13-17n-1e (otd 4896)	240	4730
Collins 2, c w½ nw nw 13-17n-1e (otd 4900)	1200	4730
Texas, Graham 1, c w½ sw sw 12-17n-1e (otd 4905)	26	4733
Longan 2, c e½ nw nw 12-17n-1e (otd 4890)	2400	4818
Mid-Continent, Nottingham 1, nwc se 18-18n-2e (otd 4842)	62	4706
Roy Starr, School Land 1, c w½ sw sw 16-20n-2e	*	4944
Pontotoc County—		
Lake, Gray "B" 6, sw ne sw 25-5n-4e	22	2570
Pottawatomie County—		
Viersen, Greenlee 2, se sw sw 26-6n-4e	50	2965
Andrade, Decker 1, se nw sw 16-7n-4e	62	3554
Gulf, Green 7, nw nec se 17-7n-4e (pg 3614)	¶0.5	4212
Seminole County—		
Amerada, Davis 1, swc ne 3-10n-5e (otd 4425)	443	4687

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PHOTOGRAPHIC MAPS
REGIONAL BASE MAPS
LAND OWNERSHIP MAPS
ABSTRACT SERVICES

United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
PENNSYLVANIA		
BRADFORD DISTRICT		
C. M. Lippert et al, Lippert	8	...
N. V. V. Franchot, Campbell	15	...
Messer Oil Corp., Loop	1½	...
Walker Bros. et al, Bing 272	2	...
Forest Oil Corp.	1	...
Forest Pet. Corp., 2 wells	2	...
Niagara Oil Corp.	1	...
Bradford Tr. Co., 18 wells	18	...
Water Intake Wells—		
Pine Run Oil Co., Bing 130-1-2-3-4-6	...	...
Forest Pet. Corp., 2 wells	...	...
NEW YORK-PENN GAS FIELD:		
Empire Gas & Fuel Co., Crandall	¶	...
MIDDLE DISTRICT		
Venango Oil & Land Co., Lower Reno	½	...
George H. & Edgar J. Elder, Elder	1	...
S. H. Elder & Co., Elder	1	...
Titusville Trust Co. & Fleming, Lot 3192	½	...
BUTLER-ARMSTRONG DISTRICT		
E. J. Oswald, Oswald	¶	...
East Texas		
Longview Area—		
Dyck Oil Co., Christian 14 (37-ac)	.7000	3582
Magnolia, Jones 22 (116¼-ac)	.4500	3656
Shell, Akin 23 (100-ac)	.6500	3613
Franklin County (Talco)—		
Magnolia, Rutherford 2	280	4270
Wood County (Wildcat)—		
Bobby Manziel et al, Morrison 1, (pb to 4917 ft)	125	4962
West Texas		
Crane County (Ella Waddell)—		
Gulf, Waddell 35 (pb to 3435 ft)	32	3677
Crane County (Gulf-Waddell)—		
Gulf, Waddell 36	*	3573
Ector County (Goldsmith)—		
Gulf, Goldsmith 328	891	4252
Goldsmith 329	880	4183
Goldsmith 330	583	4228
Ector County (Jordan)—		
Gulf, University 5-N	924	3600
Ector County (North Cowden)—		
Octagon Oil Co., T. P. Land Trust-Tidal 1	318	4180
Gaines County (Seminole)—		
Amerada Pet. Corp., Mann 7	243	5245
Mann 8	734	5259
Matthews 2-A	639	5376
Turlin 3	485	5280
Gaines County (Wasson Deep)—		
Amon Carter, Wasson 5-D (new pay)	790	6881
Hockley County (Slaughter)—		
Bass & Dillard, Hefner-Forehand 3	.1038	4996
Pecos County (Apco)—		
Humble, Shearer 1 (pb to 4697 ft)	71	4782
Pecos County (Walker)—		
R. L. Walker et al, White-Baker 2	51	1940
Terry County (Wildcat)—		
Denver P&R Co., Lewis 1	*	5537
Upton County (McCamey)—		
Gulf, Shirk 18	51	2758
Ward County—		
Gulf, O'Brien 152	616	2692
O'Brien 156	293	2777
Magnolia, Sealy 3-41	416	2921
Winkler County (Scarborough)—		
Richardson Oils, Scarborough 9-F	142	2900
Yoakum County (Wasson)—		
Don Danvers et al, Bennett-Shell 3	789	5270
T. P. Coal & Oil Co., Hearne 6	.1106	5250
WEST CENTRAL TEXAS		
Shackleford County (Wildcat)—		
Roeser-Pendleton & Continental, Cook 1-A-118	55	1700
North Texas		
Archer County (Hull-Silk)—		
Sinclair Prairie, Jones 1	180	3790
Archer County (Hull-Silk Deep)—		
Helmerich & Payne, Jones 1	2016	4618
Cooke County (Walnut Bend)—		
Sinclair Prairie, Hudspeth 2	*	4347
McGeorge 17 (pb to 4350 ft)	259	4949
Timmis 3	603	4913
Montague County (Nocona)—		
Carnation Pet. Co., Baker 1	1072	5396
Stanolind, McCool 3	984	5289
Wichita County (K-M-A)—		
Magnolia, Barton 5	276	3825
Wilbarger County (Fargo)—		
Amerada, Folley 1	400	4627
Texas Panhandle		
Carson County—		
Clayton-Dwyer Dr. Co., Schafer-Texaco 2	78	3068
Schafer-Texaco 3	39	3090
Cities Service, Magnolia 2-C	129	3158
Magnolia, Fee (Tr. 244) 94	473	3080
Hutchinson County—		
J. E. Crosbie, Inc., Cockrell 3	200	2929
Stanolind, Haile 21-B	68	3024
Wheeler County—		
Hugale Oil Co., Binkley 9	*	2462
Flambeau Oil Co., Patterson 1	316	2111
Texas Gulf Coast		
Fishers Reef—		
Standard of Texas, State 1-47	*	9003
West Columbia—		
Gulf, Mays 6	388	5695
Withers—		
Texas, Pierce B-68	110	5376
Brazoria County—		
Skelly, McDonald 1, Pledger	*	9165
South Texas		
CORPUS CHRISTI DISTRICT		
Hidalgo County (Samfordyce-Sullivan City)—		
Phillips Pet., Saenz 1	300	4266
Jackson County (Lolita)—		
Magnolia, Wesson 2	500	5932
Jim Wells County (Wade City)—		
Arkansas Fuel Oil, Schrade 2	175	4941
Live Oak County (Ezzell)—		
B. F. Cowan, Swearingen & Miller 8	25	1503
Live Oak County (Wildcat at Mountain View)—		
Sal Vieja Oil Co. et al, Riser 2, sur 410	*	2905
Nueces County (Bentonville-King)—		
Southern Minerals, Walker 2	450	5493
Nueces County (Stratton)—		
Southern Minerals, Stratton Comm. 6	500	6668
Nueces County (E. White Point)—		
W. R. R. Oil Co., State 3 (976)	600	5655
Nueces County (Wildcats)—		
H. H. Howell, Hellman Bros. 1, E. R. Oliver sur 148, 520-ac lse	*	7608
Mattiza, blk 2, 86-ac lse	*	6512
Refugio County (Refugio)—		
Ce-Beth Oil Co., Mitchell 6-B	22	6865
Victoria County (McFaddin)—		
Transwestern Oil Co., McFaddin 18-E	¶10.0	6411
Victoria County (Heyser)—		
Gulf, Unknown	600	5493
Victoria County (Wildcat)—		
Humble, Ragsdale 1, Garcia gr.	*	6736
LAREDO DISTRICT		
Duval County (Cedro Hill)—		
Magnolia, DCRC 21-132	40	1476
Duval County (Hoffman)—		
Padua Petr. Co., Smith & Corkhill 1	*	2672
Duval County (Driscoll)—		
Continental Oil, Driscoll 60-A	*	3351
Driscoll 4-B	*	2579
Duval County (Charamousca)—		
Magnolia, Duval Co. Rch. Co. 10 (289-290), extends fld 1 mi s.	180	1550
Jim Hogg County (Colorado)—		
K. M. Huber, Trevino 2	¶5.0	2955
Sun, Thaxton 16	325	3042
Jim Hogg County (Wildcat)—		
Jay Simmons, Palacios 1, Mary Montgomery sur 230, 3 mi sw Randado	*	2958
McMullen County (Calliham)—		
Marion Prod. Co., Lark 10-A	*	1027
Starr County (Sun)—		
Sun, Montalvo 7-A	450	4886
Starr County (Yzaguirre)—		
Complete Oil Well Service, Yzaguirre 2	*	5410
Starr County (Wildcat)—		
Bishop & Moss, Ricaby 1	¶2.0	1770
SAN ANTONIO DISTRICT		
Bastrop County (Wildcat)—		
Marts & Beavens, Warnet 1, 194-ac lse, J. Billingsly sur	*	1723
Bexar County (Gas Ridge)—		
John B. Peacock, Barker 3	2	553
Caldwell County (Dale-Bee Creek)—		
Ralph R. Ogden, Miears 5-A	315	2148
Guadalupe County (Elm Creek)—		
P. G. Rouse, Lenz 8	7	822
E. E. Hillje, Knopp 1, s of field	*	1050
Lee County (Wildcat)—		
Fred Pedersau, Brown 1, 201-ac tr, D. Hudson sur	*	8786
Medina County (Wildcat)—		
G. P. Oakes, Nientenhoefer 1, 64-ac tr, J. Christilles sur 212	*	1400

Change in Tenure of Mexican Judges May Aid Industry

The small amount of private enterprise left in the oil industry in Mexico was heartened recently when President Avila Camacho offered to the senate an amendment to the Mexican constitution which would abolish the six-year term for all judges, ranking from district judges up to and including supreme court judges.

If the amendment is approved, the constitution will provide no term of office for these judges, and justices of the supreme court will, therefore, be appointed for life. They will, however, be liable to removal for evil conduct provided the removal is approved by a majority of congress on the request of the president.

Ex-President Cardenas was the man responsible for making the current tenure of supreme court judges six years, or a term to coincide with the regime of the president who put them in power. The charge frequently was made during Cardena's administration that supreme court judges many times were influenced in their decisions by political considerations. Such a charge was hurled when the supreme court upheld Cardena's expropriation of the foreign-controlled oil industry in 1938. The same court on numerous occasions had held that the Constitution of 1917, which declared all sub-soil wealth property of the nation, did not apply retroactively to companies that had acquired their properties and concessions prior to the date on which the Constitution of 1917 became effective.

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WILDCAT REPORT
New Starts and Completions

CALIFORNIA
FIRST REPORTS

Kern County—Kern Valley Dr. Co.'s Williams 1, sec 30-30-30, lcn, Edison area.

Humboldt County—M. B. Daly's No. 1, sec 2-1-2; bldg rig, Humboldt area.

Orange County—State Co.'s Rowland 1, sec 14-2-10, rig, Puente area.

KANSAS
FIRST REPORTS

Barton County—Piggott et al's Beran 1, c e½ ne ne 24-17-12w, rur. Fred Steckel et al's Fee 1-A, c s½ sw ne 11-20-12w, rur.

Ellsworth County—Pryor & Lockhart's Weisenthal 1, sw se ne 30-15-10w, lcn.

Pawnee County—Atlantic & Skelly's Wratil 1, c e½ se nw 15-22-15w, lcn.

Stafford County—Vickers Pet. Corp.'s Stewart 1, c e½ ne ne 22-25-11w, dr.

COMPLETIONS

Ness County—Aladdin et al's Jedlicka 1, c ne ne 33-20-23w, 24 mi se Aldrich pool, Anhydrite 1440 ft, Winfield 2365 ft, Ft. Riley 2430 ft, Base Wreford 2665 ft, base Cottonwood 2810 ft, Topeka 3345 ft, Lansing 3711 ft, Conglomerate 4331 ft, Mississippi 4348 ft, sso, Kinderhook 4510 ft, Viola 4539 ft, Simpson 4762 ft, Arbuckle 4770 ft, abnd 4872 ft.

Rooks County—Helmerich & Payne et al's Baumgarten 1, c e½ se nw 25-9-19w, 7 mi n Zurich pool, Anhydrite 1545 ft, Topeka 3101 ft, Lansing 3374 ft, Sooy 3631 ft, Simpson shale 3660 ft, Arbuckle 3671 ft, dead oil, abnd 3700 ft.

Russell County—Pryor & Lockhart's Borrell 1, cn½ ne se 3-15-11w, 5 mi ne Davidson pool, Topeka 2440 ft, Dodge 2852 ft, Lansing 2866 ft, Weathered Simpson 3209 ft, Arbuckle 3214 ft, hfw 3217 ft, abnd 3220 ft. Stanolind's Driscoll 1, cn½ sw se 30-15-11w, new horizon Driscoll pool, Anhydrite 655 ft, Lansing 2945 ft, Dodge 2940 ft, Sooy 3242 ft, Arbuckle 3255 ft, td 3266 ft, pb 3260 ft, 281 bbls plus 40 percent water, 34.2-gravity.

Saline County — E. B. Shawver et al's Lacquement 1, ce½ se sw 30-16-1w, 3 mi n Roxbury pool, Lansing 2102 ft, Mississippi 2708 ft, abnd 2738 ft.

SOUTH LOUISIANA
FIRST REPORT

Jefferson Parish—Reese Carter's Fee 1, Westwego area, sec 3-13s-23e, ¼ mi e Titanic's Marrerro 1, showing for producer.

MICHIGAN
FIRST REPORTS

Allegan County—Clapsaddle & Harris' Wall 1, nw ne se 31-1n-14w, dr.

Clare County—Freeman Oil Co.'s Woods 1, ne ne 34-20n-4w, rig.

Isabella County—White & Hunt's Ball 1, w½ ne se 29-14n-4w, mat.

Muskegon County—C. D. Hoffman's Smyski 1, se sw nw 36-11n-15w, rig.

Saginaw County—Hogan Bros.' Watson 1, se se se 13-11n-1e, rig.

COMPLETIONS

Allegan County—Robt. C. Lentz's Gun Club 1, sw sw nw 26-3n-15w, Traverse 1366 ft, abnd 1421 ft.

Clare County—Sun's McIntosh 1, c s½ sw ne 16-19n-3w, Dundee 3818 ft, abnd 3915 ft.

Ottawa County—Fisher-McCall O&G Co.'s Easton 1, nw ne sw 18-7n-14w, Traverse 1947 ft, abnd 1972 ft.

Van Buren County—Twin Dr. Co.'s Tomcala 1, se se se 24-2s-15w, abnd 1078 ft.

MISSISSIPPI
FIRST REPORT

Hinds County—Hassie Hunt's Montgomery 1, nw sw 12-5n-4w, rig.

OKLAHOMA
FIRST REPORTS

Lincoln County—K. G. F. F. Oil Co. et al's Adams 1, sw nw nw 3-14n-4e, lcn.

Noble County—Elson et al's Conway 1, nec 16-23n-2w, dpd.

Okfuskee County—Burke-Greis et al's Mullins 1, sw se se 5-10n-10e, rust.

Pottawatomie County—Grisso et al's Le Rean 1, nec sw 33-6n-3e, owdd, mirt.

COMPLETIONS

Hughes County—Ed Scruggs et al's Black 2, nw ne ne 13-9n-10e, discovery, ¾-mi n of West Wetumka pool, Salt sd 1700-32 ft, Booch 2179-2217 ft, Gilcrease 2545-58 ft, td 2600 ft, pb 2220 ft, 671,000 ft gas from Booch.

Okfuskee County—Keener O.&G. Co.'s McKernan 1, nwc ne 26-12n-8e, 1¼-mi ne Dill pool, Wewoka 1720 ft, Oswego 2030 ft, Henry Coal 2400 ft, Brown lime 3363 ft, Gilcrease 3684-87 ft, sso, Cromwell zone 3840 ft, sso, abnd 3871 ft.

Osage County—Brookhaven Oil Co. et al's Osage 1, nec sw 6-22n-8e, 2 mi s Gilliland pool, Oswego 2260 ft, Mississippi 2692 ft, base Miss 2861 ft, so 2708 ft, Oread 2872 ft, Arbuckle 3040 ft, hfw, abnd 3090 ft.

Payne County—J. E. Crosbie et al's Moore 1, nec nw 29-19n-2e, ½-mi s W Stillwater pool, Bird Creek 1555 ft, Deer Creek 1750 ft, Hoover 1640 ft, Lecompton 1745 ft, Tonkawa 1795 ft, Oread 1847 ft, Dewey 2840 ft, Oswego 4010-60 ft, so 4050-60 ft, Mississippi 4418 ft, odor gas 4440-50 ft, Chat 4615 ft, Misener 4638 ft, Hunton 4639 ft, Sylvan 4683 ft, Viola 4755 ft, Dense 4794 ft, Dolomite 4815 ft, Wilcox 4834 ft, td 4847½ ft, pb 4458 ft, dst with packer 4432 ft, open 30 minutes, had ssg with 1500 lbs csg pressure, abnd.

Pontotoc County—Simpson-Roodhouse Dr. Co.'s Montpelier 1, swc nw 20-2n-6e, w of West Fitts pool, Cromwell zone 2935 ft, Cromwell sd 3045-55 ft, sso, Penn Caney 3055 ft, Woodford 3690 ft, Hunton 3892 ft, Harrigan 3925 ft, Sylvan 4208 ft, Viola 4270 ft, Trenton 4302 ft, Simpson sd 4386 ft, abnd 4818 ft.

SOUTH TEXAS
FIRST REPORTS

Goliad County—W. R. Davis' Webb 1, 950-ac lse, tr 8, Thomas Hancock sur, abstract 142, 4000 ft w Albrecht 1-B, elev 235 ft, 5300-ft test, lcn.

Jackson County—L. A. Wagner's Wilbeck 1, 289-ac tr, T. H. P. Heard lge, 136-ac Ragsdale

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Kenedy County—101 Oil Co. & C. G. Newton's Kenedy 2, 2485-ac lse, Jose Antonio Leal de Leon gr, 40-ac lse, 8 mi sw Mofflin, 8000-ft test, lcn.

Live Oak County—Edwin M. Jones' West Est. 3-B, Nelson Owen sur, sec 56, 4 mi sw George West, 8500-ft test, lcn.

McMullen County — Magnolia's Rhode 1, Scale & Morris sur, 2240-ac lse, 4 mi ne Brazil, 3200-ft test, lcn. W. M. Stephenson's L. Jacob Corp. 4, 100-ac lse, J. Fadden sur, 4 mi nw Calliham, 1500-ft test, lcn.

Medina County—Lewis Prod. Co.'s Blatz 1, Martin Nester sur, 4 mi se Devine, 3500-ft test, lcn, Wiegand Bros., cont.

Nueces County—Stanolind's Shaffer 1, 271-ac tr, lot 7, block 4, Mary Luby subd, Canutillo Colony Co. sur, ab 464, 1½ mi w Luby fld, 6500-ft test, lcn.

San Patricio County—L. A. Douglas' Henry 1, blk 36, Drummond subd, E. Nelson 1/3 lge, 150-ac lse, 5 mi se Odem, elev 36 ft, 7100-ft test, lcn.

Victoria County—Sunray Oil Co. & Colton & Colton's Terrell 1, 125-ac tr, John B. Sideck sur, ½ mi nw Colton & Colton's Terrell 1, discovery, 5600-ft test, elev 102 ft, lcn.

Webb County—W. C. McBride's Leal 3, sw¼ of nw¼ of sur 461, 240-ac lse, 8 mi n Bruni, 3100-ft test, lcn.

COMPLETIONS

Bastrop County—Marts & Beavens' Warnet 1, J. Billingsly sur, 3 mi sw Cedar Creek, abnd 1723 ft.

Duval County—Magnolia's Duval Co. Rch. Co. 10, GC&SF sur 290, 7550 ft nw, W. Casa Blanca, 180 bbls flowing, ¾-in ch, 220 pounds tubing pressure, 3 flow collars, gr 21, wtr 0, gas/oil ratio low, td 1550 ft, 1 mi sw extension Charamousca fld.

Guadalupe County—E. E. Hillje's Knopp 1, E. Smith sur, s of Elm Creek fld, abnd 1050 ft, Bryan Patterson, cont.

Jim Hogg County—Jay Simmons' Palacios 1, Mary Montgomery sur 230, 3 mi sw Randado, abnd 2958.

Lee County—Fred Pedersau's Brown 1, D. Hudson sur, 2 mi s Tanglewood, abnd 8786 ft, Fred Pedersau rig.

Live Oak County—Sal Vieja Oil Co. et al's Riser 2, sur 410, Mountain View area, abnd 2905 ft.

Medina County—G. P. Oakes' Nientenhoefer 1, J. Christilles sur 212, 1½ mi ne Dunlay, abnd 1400 ft.

Nueces County—H. H. Howell's Hellman Bros. 1, E. R. Oliver sur 148, 4 mi sw Clarkwood, 2 mi n Shield fld, abnd 7608 ft. H. H. Howell's Mattiza 1, 1 mi w Violet, abnd 6512 ft.

Starr County—Bishop & Moss' Ricaby 1, blk 13, porc 81, 1¼ mi s production in Ricaby fld, 750,000 ft gas, ½-in ch, 600 lbs tp, 625 lbs cp, perf 1449-56 with 20 shots, extends Ricaby fld.

Victoria County—Humble's Ragsdale 1, V. Garcia gr, 5 mi s Inez, abnd 6736 ft.

EAST TEXAS

FIRST REPORT

Anderson County—Texas Co.'s Greenwood 1, sec 370-ac tr, M. Salisar sur, Keechi Dome, rur.

COMPLETION

Wood County—Bobby Manziel et al's Morrison 1, sec 62-ac tr, Jas. Pollock sur, discovery Hawkins dome, elev 423 ft, Pecan chalk 3193-3485 ft, Austin chalk 4501-4652 ft, Woodbine series between 4789-4804 ft, td 4962 ft, pb to 4917 ft, perf casing 4909-16 ft., pumped 125 bbls net oil, plus considerable water.

WEST TEXAS

FIRST REPORT

Fisher County—Long & Wolf's Humphries 1, c nw nw HT&B sec 45, blk 1, rur.

COMPLETIONS

Gaines County—Amon G. Carter's Wasson 5-D, swc se PSL sec 50, blk AX, elev 3555 ft (new deep pay for Wasson structure), Tubb or Sand Hills lime pay 6250-6881 ft, 18,500 gals acid, flowed 790 bbls 32-gr oil potential, ¾-in choke.

Terry County—Denver P&R Co.'s Lewis 1, sec se J. H. Gibson sec 62, blk DD, elev 3302 ft, anhydrite 2390 ft, Yates sand 3390 ft, brown lime 4460 ft, Grayburg lime 4740 ft, abnd 5537 ft.

Shackleford County — Roeser-Pendleton & Continental's Cook 1-A-118, c se sw E. T. Ry. sec 118, elev 1811 ft, Lower Hope sand 1697-1700 ft, pumped 55 bbls 39-gr oil initial.

TEXAS GULF COAST

FIRST REPORTS

Brazoria County—Rowan & Nichols' Mattingly 1, se Manvel fld, sec 25, HT&B Survey, lcn 6500-ft test.

Harris County — John Mayo and George Echols' Hardison 1, Cypress area, J. W. Moody sur, 1 mi ne Gulf Roberts 1, dry hole, dr 836 ft.

COMPLETION

Brazoria County—Skelly's McDonald 1, Flag Pond area, 3 mi se Pledger fld, abnd 9166 ft, mech difficulties.

WYOMING

FIRST REPORT

Niobrara County—Western Pet. Co.'s Mosier 1, sw sw 31-35n-64w, Dakota High structure, objective Sundance Leo formation, 2800 ft, mi combination rotary-cable tool machine.

South Texas Oil Law Lectures Start January 16

The sixth annual lecture series on Oil and Gas Law sponsored by the South Texas School of Law, Houston, was announced last week by Judge E. E. Townes, dean of the school and head of the legal department of Humble Oil & Refining Company.

The lectures will be given each Thursday evening, beginning January 16, from 8 to 10 o'clock at the Houston YMCA. A staff including Charles I. Francis, Judge H. E. Bell, A. W. Bounds, T. J. Lawhon, J. Q. Weatherly, James L. Shepherd and Herman P. Pressler will present lectures on important legal phases of the industry.

Hastings Acreage Awarded To Texas in Vacancy Suit

A judgment rendered last week by District Judge Ralph Yarborough in the Fifty-Third District Court awarded 113 acres of land in the Hastings oil field, Galveston and Brazoria counties, to the state, which included Tracts 3, 4, and 6.

Defendants in the two-year-old vacancy suit were awarded Tracts 1, 2, and 5, a total of some 383 acres.

Both sides are planning an appeal to the Third Court of Civil Appeals at Austin, attorneys said.

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MEN IN THE INDUSTRY'S NEWS

ROBERT L. LERCH has been appointed General Sales Manager of Haynes Stellite Company, unit of Union Carbide and Carbon Corporation. He has been associated with the Company since 1924. During World War I, he served in the United States Marine Corps. After the war, he returned to Lehigh University from which he was graduated in Chemical Engineering in 1922. He then spent a year and a half in various plant departments of Bethlehem Steel Company, joined the Haynes Stellite Company as a sales engineer in the New York district, later transferring to the Chicago territory, and next serving as district sales manager at Los Angeles and at Houston. Since 1929, he has been advertising manager and assistant to the general sales manager.

HARRY L. ERLICHER, purchasing agent for General Electric Company last week was named a vice president of the company. He started with the company 40 years ago, at the age of 14, as a messenger boy. He asked to be assigned to the purchasing department, and after a short time as office boy, was made a clerk. In 1910 he was named a buyer, in 1923 was promoted to assistant purchasing agent, and in 1931 was named general purchasing agent. He will continue his purchasing duties.

J. A. CHAPMAN, Tulsa operator and associate of Ed McFarlin in the development of extensive holdings in North Texas, has expanded his ranch activities through purchase of 156,765 acres in Northern New Mexico from J. I. Staley and his brothers, who are Wichita Falls oil men.

J. HAL MARSHALL, formerly in the sales department of Composite Steel Division, has been named sales representative in the Buffalo district by Jessop Steel Company, Washington, Pennsylvania. He is a graduate of Marietta College, Marietta, Ohio.

ELMER GHRIST, who has served two years in the chemical department and three years in the metallurgical department of Jessop Steel Company, Washington, Pennsylvania, has been named metallurgist. He graduated from Washington & Jefferson College in 1932.

E. E. HAUBETTER has been named assistant district sales manager in the Houston territory for Republic Steel Company. He has been with Republic Supply Company during the past five years, and prior to that time was with The Carter Oil Company for 10 years.

A. R. WEIS, president and general manager of Pacific Pump Works, Los Angeles, has been elected to the board of directors of Dresser Manufacturing Company, Bradford, Pennsylvania. He became president of Pacific Pump Works in October, 1940, after serving as vice president and chief engineer of the company's organization in 1924.

CHARLES R. SWANK, superintendent of the Louisiana-Arkansas district of the Magnolia Pipe Line Company with headquarters at Shreveport, was retired January 1 after being engaged in the pipe line business for 44 years. He worked for the Eureka and Buckeye systems before moving to Texas to take part in the building of Magnolia Pipe Line Company's original carrier. Swank plans to go to Florida and pursue his hobby of fishing during the remainder of the winter.

O. H. BESHELL has succeeded J. A. Smith as superintendent of Magnolia Pipe Line Company in the Olden, Texas, district, due to the latter accepting retirement January 1. Smith began work in February, 1900, with Buckeye Pipe Line Company, and entered the service of Magnolia Pipe Line Company May 1, 1924.

W. MORTIMER SMITH, secretary and office manager of Landreth Production Corporation, Fort Worth, became critically ill, necessitating an intestinal operation, while spending the holidays with his family in Los Angeles. Ed. A. Landreth, head of the firm, departed early last week by plane for Los Angeles when Smith failed to show improvement.

C. S. ATWELL, former vice president of Sogac Pipe Line Company, with headquarters at Barranquilla, Colombia, has been transferred to the refining department of The Texas Company in the United States. He will take up his work, probably in Port Arthur, following a vacation.

CLARENCE M. DOISEAU has been named president of Cincinnati Ball Crank Company, succeeding Reamy C. Field, board chairman, who had been acting as temporary president. Doiseau joined the company in April as vice president and general manager.

MAURICE P. TIXIER, engineer with Schlumberger Well Surveying Corporation who recently returned to the United States after serving as a lieutenant in the tank corps of the French army, discussed European affairs before the Tulsa Chapter of Nomads recently.

T. S. MURPHY is in charge of a recently opened New York office for Black, Sivalls & Bryson, Inc., Kansas City and Oklahoma City, at 30 Rockefeller Plaza. He has a background of several years' experience in the engineering department of the company.

L. J. MILDREN, 72, formerly in charge of the production department of Marland Oil Company, Ponca City, and more recently an oil operator, died December 30 in a Tulsa hospital. He was a native of Pennsylvania.

MORRIS BROWN, 43, of Brown Oil Field and Equipment Company, Seminole, Oklahoma, died December 30 following a brief illness.

G. T. ROCKENBOUGH has been named sales manager for McEvoy Company, Houston, for North Texas and Oklahoma. He has had 16 years experience in Texas, Oklahoma and Kansas fields, specializing in surface control and completion equipment. He will make his headquarters at 1714 Collins Street, Wichita Falls, Texas.

A. W. AMBROSE, vice president of Cities Service Oil Company, has been elected president of the Bartlesville Chamber of Commerce. John H. Kane, Phillips Petroleum Company, retiring president, was named first vice president and K. S. Phillips, Phillips Petroleum Company, was elected second vice president.

P. M. ROBINSON, chief engineer for The Peenzoil Company, who has been granted a leave of absence to become assistant to Dr. R. E. Wilson, head of the petroleum section, raw materials division of the Advisory Commission to the Council of National Defense, has taken up his duties in Washington.

FRANK BRIGGS, engineer with S. M. Jones Company, has been transferred to Midland, Texas. Although Briggs has been covering the West Texas-New Mexico area in recent months, he previously had been making his headquarters in Tulsa.

E. H. BESSE, Casper, official of Kittery Oil Company, is president of Kittery Pipe Line Company, which has been formed to build a natural gas pipe line from the Kittery gas pool, Northwestern Shackelford County, Texas, to nearby oil pools for repressuring.

F. B. JACKSON, JR., producing associate of Geier Bros., Inc., has transferred headquarters from Wichita Falls to Dallas, where general office has been established in the Gulf States Building.

A. P. CALLAHAN, petroleum engineer in in eastern Kansas for Sinclair Prairie Oil Company and a first lieutenant in the Field Artillery Reserves, reported at Fort Sill, Oklahoma, last week for active duty.

HERMAN KAISER, assistant purchasing agent for Phillips' Petroleum Company and president of the Purchasing Agents Association of Tulsa, addressed a Bartlesville civic club recently on "Purchasing."

GEORGE L. CHRISTY, of Colombian Petroleum Company's Bogota staff, has returned to the United States.

J. D. McCLURE, geologist and engineer for Barnsdall Oil Company, who has been observer in Michigan, has been named manager of land and geological

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MEN IN THE INDUSTRY'S NEWS

offices of the firm at Midland. He succeeds A. P. Loskamp, who resigned to head the West Texas division office of Union Oil Company of California.

W. F. CLINGER, Clinger Oil & Gas Company, Tidioute, Pennsylvania, has been named to the production advisory committee of the Pennsylvania Grade Crude Oil Association.

H. S. SEE, The Atlantic Refining Company, Dallas, has been named chairman, and H. D. Mahin of Campbell, Randolph, Mahin & Mosteller, Tulsa, has been named vice chairman of the 1941 standing committee on federal income and excise taxation of the Mid-Continent Oil & Gas Association.

Members of the committee are W. Leo Austin, Mid-Continent Petroleum Corporation, Tulsa; F. B. Branson, Gulf Oil Corporation, Pittsburgh; R. W. Clark, Skelly Oil Company, Tulsa; W. H. Cleveland, Tide Water Associated Oil Company, Tulsa; L. S. Collins, The Carter Oil Company, Tulsa; J. B. Galbraith, Stanolind Oil & Gas Company, Tulsa, Oklahoma; V. G. Gillingham, The Texas Company, Houston, S. M. Greenidge, Texas Pacific Coal & Oil Company, Fort Worth; F. P. Hagaman, Standard Oil Company of Louisiana, Baton Rouge; W. A. Hensley, Phillips Petroleum Company, Bartlesville; F. N. Highams, Humble Oil & Refining Company, Houston; M. J. Lasseigne, Arkansas Natural Gas Corporation, Shreveport; T. H. Marshall, Anderson-Prichard Oil Corporation, Oklahoma City; J. A. McNeese, Continental Oil Company, Ponca City; O. W. Meyers, Sinclair Prairie Oil Company, Tulsa; Ream V. Miller, Shell Oil Company, New York; F. B. Plank, Cities Service Oil Company, Bartlesville; E. C. Seymour, Magnolia Petroleum Company, Dallas; G. W. Patchett, Mid-Continent Oil & Gas Association, Tulsa, committee secretary.

The following steering committee chairmen have also been named: W. Leo Austin, Mid-Continent Petroleum Corporation, Tulsa, for federal income, excess profits and capital stock taxes; W. H. Cleveland, Tide Water Associated Oil Company, Tulsa, for federal excise taxes; Guy L. Tate, Magnolia Petroleum Company, Dallas, for pipe-line transportation taxes; W. A. Hensley, Phillips Petroleum Company, Bartlesville, for Oklahoma income tax steering committee; J. W. Baldwin, Cities Service Oil Company, Bartlesville, for Kansas income tax steering committee; J. B. Galbraith, Stanolind Oil & Gas Company, Tulsa, for New Mexico income tax steering committee, and M. J. Lasseigne, Arkansas Natural Gas Corporation, Shreveport, for Louisiana-Arkansas income tax steering committee.

HARRY B. COLE, gauger for Magnolia Pipe Line Company in the Walters, Oklahoma, district, was retired January 1 after being with the company 22 years.

IRA E. DUGAN, former deputy conservation agent for the Oklahoma Corporation Commission at Ada, has joined Franks Manufacturing Company, Tulsa.

C. N. WRIGHTER, of Kevin, and L. J. Yealy, of Shelby, have been appointed by Montana's Governor Roy E. Ayers to the Oil Conservation Board of the State of Montana. They will fill the unexpired terms of George R. Downs and Tom Stout, resigned.

CHARLES A. CONLEY, 57, West Central Texas drilling contractor, died December 26 at his Ranger home after a brief illness. The body was taken to Sapulpa, Oklahoma, for burial.

WARREN H. WYNN, geologist for Sinclair Prairie Oil Company at Shawnee, Oklahoma, and more recently in Tulsa, has been transferred to Bismarck, North Dakota.

MAX E. LANDRY, Tulsa, has been named sales representative for The Bruce-Macbeth Engine Company, Cleveland, and will cover Oklahoma, northwestern Arkansas and southern Kansas.

BRUCE BARKIS, of B & W, Inc., Houston, recently discussed "Improving the Preliminary Cement Job" before the student section of the American Institute of Mining & Metallurgical Engineers at the University of Texas.

CLARENCE GLASGOW, engineer for National Tank Company, Tulsa, addressed the Seminole (Oklahoma) chapter of the American Petroleum Institute December 16 on "Gravity Conservation."

J. A. McCARTY, petroleum engineer for Gulf Oil Corporatioin, has been transferred from Webb City to Fairview, Oklahoma, in connection with drilling a deep wildcat in Woods County.

OSCAR HUDSON, geologist for Midstates Oil Corporation, has returned to Tulsa after spending considerable time in Jackson, Mississippi.

M. H. CHAMPION has resigned as traffic manager for Anderson-Prichard Oil Corporation and Coltex Refining Company. He will continue as president of Petroleum Rail Shippers Association.

LLOYD A. SUMMERS, division engineer for Lago Petroleum Corporation, Venezuela, has been inspecting manufacturing plants in the Mid-Continent area.

M. B. GENTRY, who joined Freeport Sulphur Company in 1935 as assistant to the president, last week was elected a vice president. He has been in charge of foreign sulphur sales.

THOMAS E. WHALEN, district gauger for Oklahoma Pipe Line Company, St. Elmo, Illinois, has been awarded a 20-year service pin.

B. D. OSBORNE, mechanical engineer for Shell Oil Company, has been transferred from Lucien, Oklahoma, to McPherson, Kansas.

W. J. CHRISTIAN, chief administrative officer in West Texas for the Texas Railroad Commission, has been transferred

from Midland to Austin headquarters. S. Ross Carr, deputy supervisor, has been named as his successor at Midland.

C. B. WILLIAMS, former manager of Colombian Petroleum Company at Cucuta, Colombia, has returned to the United States. C. O. Isakson has taken up his duties in Cucuta.

W. M. VANDIVERT has been appointed North Central Texas district manager for Bethlehem Supply Company. He makes his headquarters at 824 Hamilton Building, Wichita Falls.

L. C. ALLENBRAND has been named manager of the sales development division of Caterpillar Tractor Company, Peoria, Illinois, succeeding G. E. Spain, who has been advanced to general sales manager.

After attending the University of Missouri, Allenbrand went with John Deere Plow Company in 1923 as an employe in its transfer house at Wichita, Kansas, and later at Sterling, Colorado. He later became travelling representative for the company, with headquarters in Kansas City, joining Caterpillar Tractor Company in April, 1931, as a special representative in the general sales department. Within six months, he was transferred to the sales training division, and in 1932 was made sales training representative for the western division with headquarters at San Leandro, California. After a short period with a Caterpillar distributorship in California, he rejoined the company as assistant manager of the sales training division.

L. L. SMITH, assistant treasurer of The B. F. Goodrich Company, Akron, Ohio, has been named treasurer, taking over duties formerly held concurrently with those of vice president by George W. Vaught. A. A. Sprague, board chairman of Sprague-Warner Company, Chicago, was elected to the board.

DR. R. L. BATES, West Texas-New Mexico district geologist for The Texas Company, with headquarters at Midland, has resigned to become associated with the New Mexico Bureau of Mines and the New Mexico School of Mines at Socorro.

DON DAVIS, formerly with Bovaird Supply Company and General Machine & Tool Company, will take charge of a new office at Wichita, Kansas, for Helmerich & Payne, Inc., producing and contracting firm of Tulsa.

WALTER SHEEHAN, Sheehan Pipe Line Construction Company, Tulsa, has been a visitor in Houston, Corpus Christi and Port Arthur.

Culberson Announces Texas Commission Appointment

Olin Culberson, newly elected Texas Railroad Commissioner, last week announced several new appointments, including the following to the oil and gas division: C. H. White, of Tyler, to succeed Homer Pierson as deputy supervisor at the Mount Pleasant office, and Lovell Davis to succeed Ed Dougherty as senior accountant and chief clerk of the oil and gas division. Several other replacements of accountants and statisticians in the oil and gas division were ordered, as well as numerous replacements in the motor bus division.

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Joints made of this steel have the essential strength, toughness and fatigue strength. They have the hardness necessary to resist abrasion and erosion and to stand the wear and tear of being made up tight and broken out fast over and over again.

In addition, because of the properties of SAE 4140, tool joints made of it have bores large enough to permit free fluid flow — a further aid to drilling efficiency.

Our book, "Molybdenum Steel in Oil Production," completely describes the properties and applications of this and other Molybdenum steels which are establishing service records in the field. We will gladly send you a copy for the asking.

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NOTES FOR THE Equipment Buyer and User

Center Latch Elevator

BYRON JACKSON COMPANY

A light Type A center latch drill pipe elevator for handling collar-type drill pipe and tubing where the working load does not exceed 60 tons, has been announced by Byron Jackson Company, Terminal Annex, Los Angeles.

BJ Type A Center Latch Elevator

The body is of heat-treated steel to withstand pounding effect of hardened tool joints with a minimum of upsetting, made in two halves of practically the same weight to provide proper balance and easy opening and closing. The body below the trunnions is designed with minimum width to allow more room for the links, prevent binding and to permit the lift to be exerted directly under the tool joint or tubing collar without undue stress on the elevator trunnions.

The operating handles have an underhanging knob at the outer end to provide a safe, easy grip. Stop guards are placed toward the rear of the handles to prevent the operator from crushing his hands between the handles and the links.

The elevator is locked by a T-head spring latch that fits into a recess in the body, designed so that it cannot accidentally be knocked open when tailing out. The outer end of the latch is curved to provide a hand hold when opening the elevator.

The elevator comes equipped with curved link blocks of new design to provide free movement of the elevator links when the elevator is being opened or closed. The link blocks are hinged at the top, close downwardly and are bolted in place, the design providing a C-link effect when the link blocks are closed.

A standard grease gun connection in the rear of the elevator is provided for lubrication.

Motor

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

A line of open-type sleeve-bearing squirrel-cage induction motors, designed for general purpose drive applications, have been announced by Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania.

Designated Type CS, they are available in ratings from ½- to 5-horsepower, at speeds from 875 to 3600 revolutions per minute, for operation on 110, 220, 440 and 550 volts, 2- and 3-phase AC.

Rigid complete-cast frames are designed to maintain constant air-gap between stator and rotor. Frame improvements include sealed sleeve bearings with a combination vestibule and felt washer seal, and a larger oil reservoir capacity. Oil filler cups may be inserted on either side of the motor.

Wire insulation is designed to give maximum dielectric strength, toughness and flexibility. Combination slot cells with reinforced cuffs are provided to protect windings from abrasion, and coil ends are taped for reinforcement against strains of full voltage starting.

Appearance has been improved by elimination of sharp corners and projections to give a rounded contour. Castings are buffed to produce a smooth, even surface. Finish is a light machine-tool gray.

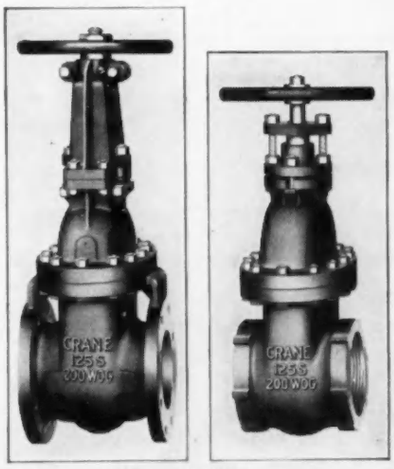
Wedge Gate Valves

CRANE COMPANY

A complete line of standard iron body wedge gate valves for 125 pounds steam, 200 pounds cold working pressures, has been announced by Crane Company, 836 South Michigan Avenue, Chicago.

The line includes brass-trimmed and the all-iron patterns, with O. S. & Y. or non-rising stem, in sizes 2- to 12-inch. Also included are quick-opening and the Underwriters' patterns, alloy trimmed, alloy cast iron valves for process work, and the standard iron body valves for marine cargo oil systems.

Design features include redistribution of body and bonnet materials to eliminate excess weight and yet comply with standard requirements, handwheels of malleable iron, deep stuffing boxes to permit a generous amount of packing, body-bonnet joints employing a flat gasket closely bolted together to provide gasket compression evenly distributed, and seat rings of shoulder type to retain tight contact with the body in spite of difference in expansion characteristics.



LEFT — O. S. & Y. FLANGED.
RIGHT — NON-RISING STEM, SCD.
STANDARD IRON BODY WEDGE GATE VALVES

Wire-Line Wiper

PATTERSON-BALLAGH CORPORATION

A wire-line wiper, designed for service on producing wells where gas and high-gravity oil are encountered, has been announced by Patterson-Ballagh Corporation, 1900 East 65 Street, Los Angeles.

Patterson-Ballagh Style B Wiper

Designated Style B, it employs a steel housing and a replaceable one-piece rubber refill which does the wiping. The housing is a hinged steel casting, held together with a butterfly nut and hinged bolt, and equipped with hold-down chains.

Nickel Alloy

THE INTERNATIONAL NICKEL COMPANY

A high-nickel alloy designed for high strength, fabrication in automatic screw machinery and for resistance to corrosion, has been announced by The International Nickel Company, 67 Wall Street, New York City. Designated KR Monel, it can be heat-treated after fabrication to provide an extra measure of strength and hardness.

The product is non-magnetic. It derives its machining qualities from thermal treatment at the mill. KR Monel is available only in rod and wire forms.

Center Latch Elevator

BYRON JACKSON COMPANY

A light center latch elevator for handling short strings of external upset drill pipe used with portable rigs and in exploratory work where the working load does not exceed 20 tons, has been announced by Byron Jackson Company, Terminal Annex, Los Angeles.

Designated Type LG, it is designed to handle external upset 18-degree taper drill pipe without use of lifting plugs. The body is made in two halves with a hinge pin in the back and a stirrup-type

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NOTES FOR THE Equipment Buyer and User

BJ Type LG Center Latch Elevator

latch hinged to one of the halves of the body, so constructed as to distribute the shear. The other half of the body has a lug which the latch engages. A safety latch is mounted on the latch, forming a handle for unlatching the elevator and locking the elevator closed.

Loop-type operating handles are designed to permit easy opening and closing of the elevator, and a third handle is placed on the rear of the elevator to provide faster, easier handling by the floor men. Lubrication is through a standard grease gun fitting on the rear of the body.

Meters

American Meter Company, New York, has issued Catalog LPG-4 describing its line of liquefied petroleum gas meters. A section is devoted to specifications for ordering liquefied petroleum gas meters, based upon the company's experience in providing specially constructed meters in a range sufficiently wide to cover butane-propane applications.

Chemicals

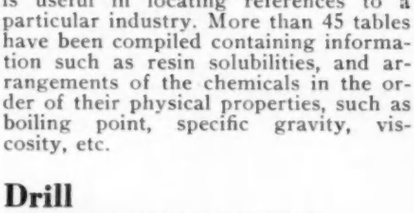
Carbide and Carbon Chemicals Corporation, 30 East 42 Street, New York, has issued a 96-page reference book, "Synthetic Organic Chemicals," containing data on properties and uses of 142 industrial organic chemicals. In a revised tenth edition, it includes six new chapters and information on 66 products not described in previous editions. Each chemical is classified and described in accordance with the characteristic group to which it belongs. The chemicals thus dealt with include practically every major family of organic chemicals—alcohols, glycols, ethers, oxides, alcohol-ethers, esters, ketones, aldehydes, acids, anhydrides, chlorinated compounds, amines, penetrants, synthetic resins, activated carbons and hydrocarbon gases. An index of the industrial applications is useful in locating references to a particular industry. More than 45 tables have been compiled containing information such as resin solubilities, and arrangements of the chemicals in the order of their physical properties, such as boiling point, specific gravity, viscosity, etc.

Drill

INGERSOLL-RAND COMPANY

Two additions to its line of "Multi-Vane" drills have been announced by Ingersoll-Rand Company, 11 Broadway, New York.

The tools range in weight from 1½ to 2⅞ pounds. Attachments are available to adapt them for light screw driving, nut running, close-quarter drilling, wire brushing and sanding. Three types of handles, straight, lever throttle and pistol-grip, are available.



Ingersoll-Rand Multi-Vane Drill

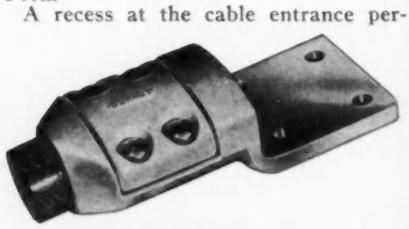
Cable Terminal

BURNDY ENGINEERING COMPANY

A cable terminal, Type SNA-H, designed to facilitate taping of the connector and to help insure a moisture-proof seal to the insulation, has been announced by Burndy Engineering Company, 459 East 133 Street, New York.

A recess at the cable entrance permits the end of the cable insulation to be inserted into the connector, shrouding the cut end of the insulation.

The connector is also made with hexagon head cap screws set in recesses in the cap in such a manner that they can be tightened with a socket wrench.



Burndy's Cable Terminal

Gas Regulator

Fisher Governor Company, Marshalltown, Iowa, has issued Bulletin 43-D, describing, illustrating and pricing its

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NOTES FOR THE Equipment Buyer and User

line of gas service regulators, safety shut-off service regulators, field regulators and low-pressure test gauges. It gives complete details and all specifications with capacity and regulation curves on the company's Types 730, 730H, 733A and 733AB house service gas pressure regulators; information on Types 738, 739 and 799A safety shut-off gas service regulators; on Type 630, a pounds-to-pounds large-capacity reducing regulator; and on Type 726 high-pressure field regulator, Type BB self-contained pressure regulator, Type 57H high-pressure gas regulator, Type 289A diaphragm safety release valve, and the company's low-pressure tent gauge.

Pyrometers

The Brown Instrument Company, Wayne & Roberts Avenues, Philadelphia, has issued Catalog 15-E describing its line of millivoltmeter-type pyrometers. Illustrations show indicating, recording and control instruments, and construction and operating features are described. Included are Diesel engine pyrometers, marine-type pyrometers and portable pyrometers.

"The Petroleum Industry" Presents Economic Study

A calm, straightforward, and reasonably thorough examination of present-day aspects of the petroleum industry is presented by Roland B. Schuman, head of the University of Oklahoma's Department of Business Management, in his "The Petroleum Industry." The book, containing 297 pages, charts and tables, interprets the problems and the spirit of the American petroleum industry for the lay reader.

Having neither bones to pick nor irons in the fire, Schuman has reduced the industry to common-sense economic essentials. His approach is dispassionately practical and interpretative, even when he discusses the higher essentiality of lubricants over other products of the industry and suggests that effective conservation of petroleum resources is an important but no emergency problem, and might best be promoted by some form of "efficient but not panic-stricken regulation of production."

Copies may be obtained from the Book Department, The Gulf Publishing Company, Box 2608, Houston, at $3 a copy.

Drillers of Dry Holes Ruled Under Wage-Hour Law

Wage and hour provisions of the Fair Labor Standards Act apply to workers on wells which turn out to be dry holes, under interpretations by the wage-hour division of the Department of Labor made public last week by the Independent Petroleum Association of America.

The interpretation was written by Rufus G. Poole, assistant solicitor of the department, in response to a request by Russell B. Brown, general counsel of the IPAA, for clarification of the application of the law to workers in the drilling branch of the industry.

Dealing specifically with the question whether well drilling which results in dry holes is covered by the wage-hour act, Mr. Poole declared:

"In our opinion, regardless of whether or not a producing well results, employes of a contractor engaged in the drilling of oil wells having concurrent or continuous contracts with an oil company or companies or with independent landlords, lessees or oil concerns, are engaged in the production of goods for commerce or in processes or occupations necessary thereto; provided, of course, that such enterprisers intend, hope or have reason to believe that the resulting oil, if any, will move in interstate commerce.

"Oil drilling operations whether or not they result in producing wells are, and have been, of vital importance in the development of the oil industry," he explained. "When the oil industry is viewed as a whole, it immediately becomes apparent that knowledge as to the unproductivity of sites is important in eliminating costly expenditures in the search for oil producing strata or territory. If enterprisers were unable to eliminate non-producing territory from further exploration through the trial-and-error method of drilling test wells, the cost of production in the industry would attain such prohibitive proportions that the industry in all its branches would be forced to cease operations. Hence, we have concluded that employes engaged in drilling for oil under the circumstances previously outlined are covered by the act as being engaged in a process or occupation necessary to the production of oil under section 3 (j) thereof."

"If oil is sold with the positive understanding that it will be consumed entirely within the state but later moves in commerce in violation of such understanding," Mr. Poole ruled, "it is our opinion that employes employed in producing such oil may, nonetheless, be covered by the act if the employer at the time the goods were produced, hoped, intended or had reason to believe that the goods would move in interstate commerce."

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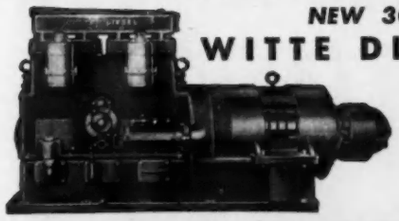

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Oil Matters Appear on Many Legislative Programs

[*Continued from page 10*]

portant factor in determination of allowables for wells subject to proration.

Kansas Gross Production Tax

Efforts to gain a gross-production tax have been made during every Kansas legislative session in the past 15 years, and it is certain that they will be renewed this year. Chances for passage of such a bill are considered slim. There are records of leases in 99 of the state's 105 counties, indicating opposition would come from all parts of the state.

The Legislative Council, a "little legislature" named to study specific problems and make recommendations to the state legislature, has been concerned during the past two years with the problem of taxing oil leases, but so far has arrived at no solution.

A proposed division on ad valorem taxation, which would be set up within the present Commission of Revenue and Taxation, as outlined in a proposed new tax code, is of interest to the oil and gas industry in that it will provide a different method of arriving at the factors which go into corporation assessments. The measure proposes to set up a system of systematic assessments in each county, with a full-time county assessor employed and with the offices of county clerk and county register of deeds consolidated into one office. County assessors would be appointed by county commissioners on a merit basis. A plan compelling the taxpayer to make his own personal property return is also incorporated in the new code, the return to be followed by a check by the county assessor. The measure is considered quite controversial, and probably would undergo many changes before any part of it is placed on the statute books through final action of the legislature.

Montana Consolidation Proposal

Efforts to consolidate all state regulatory powers over oil and gas wells, oil and gas production, transportation and storage into a single board or commission are expected to be made before the Montana legislature. A second proposal advanced in some quarters would consolidate with those powers all those concerning metalliferous and other mineral deposits and mining operations along with the present State Bureau of Mines and its geological department.

The oil industry is expected to oppose the second proposal because of a great disparity in importance of the petroleum industry and the mining industry in the state. Representatives of the mining industry would predominate on such a body, while on the other hand it is not expected that the mining operators are sufficiently interested to give the proposal their vigorous support.

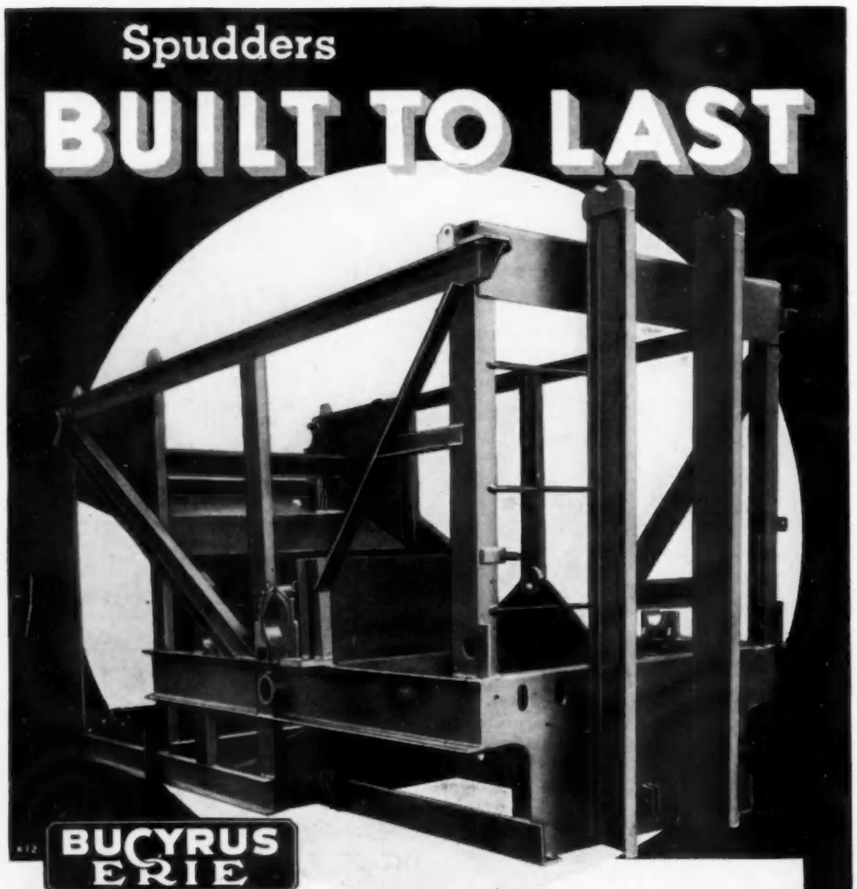
The Montana Oil Conservation Board has advocated a bill to reduce the license tax of ¼-cent a barrel on crude oil to 1/5-cent. Revenue from the tax is used to pay the expenses of the board.

Arkansas Act Workable

The present Arkansas Oil & Gas Commission was created by an act of the 1939 legislature, following a study by Senate and House committees of conservation laws of other states. Chairman O. C. Bailey reports that no unworkable features have been found in the present act, and that the commission "is not contemplating asking the legislature to make any changes or revisions."

In practically all states, bills will be introduced to increase gasoline taxes, to limit transportation of gasoline by truck, to restrict use of trucks on week-ends and holidays, and to divert gasoline-tax revenue to purposes other than road construction and maintenance. In oil states, producers groups will join with other branches of the industry in opposing legislation that would restrict use of petroleum products, or make its handling more difficult.

CHARLES E. KRAMPF, Bradford, Pennsylvania, has resigned as president of Penn Valley Crude Oil Corporation and Indian Drilling Corporation. He will continue as a producer in Olean, New York.



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SOUTH MILWAUKEE, WISCONSIN

Squeaks from the Bull Wheel

Refugee

"Is your daddy home, sonny?"

"No, sir. He hasn't been home since mama caught Santa Claus kissing the maid."

Sho

"Boy! when Ah kisses my wife she jes closes her eyes."

"Ah'll say she do."

"What's dat?"

"Ah say, do she?"

Hope Come True

Have any of your boyhood hopes been realized?

Yes, I recall one. When my mother used to spend so much time combing my hair, I always wished I didn't have any.

Starting at the Bottom

If you stood in my shoes, what would you do?

I'd give them a shine, to start with.

Not the Right Answer

A boy came in from school one day and said: "Pop, how much is a billion dollars?"

And his papa replied, "It's a helluva lot of money."

The next day the boy came back from school crying, and the father said, "What is the matter with you, son?"

"That wasn't the right answer," the boy replied.

Tip to Draftees

Weak eyes, eh? How many lines can you read on that chart?

What chart?

Just an Idea

Two roughnecks walking along passed one of the town's most ravishing and alluring beauties.

"I feel like taking her out again," whispered one.

"Have you had her out?"

"No—but once before I felt like it."

This Changing World

At five, the youngster says: "The stork brought us a new baby sister."

At ten: "My dad can lick any man twice his size."

At fifteen: "Girls are—blah."

At twenty: "Just give me a chance—I'll show 'em."

At twenty-five: "The system is all wrong; there should be a reform."

At thirty: "In a few years people will wake up and demand their rights."

At thirty-five: "I'd be rich if I had stayed single."

At forty: "Give me another bottle of that hair tonic."

At forty-five: "I'm sick of reformers."

At fifty: "I always drink rye—Bourbon upsets my stomach."

At fifty-five: "Thank God, I've got a good bed."

At sixty: "I was mighty lucky to pick such a fine woman."

At sixty-five: "I feel as young as I did twenty years ago."

At seventy: "I don't know what these modern young people are coming to."

At seventy-five: "Hurry, Ma, or we will be late for church."

Going Up

"Just fancy that," exclaimed the proud mother. "They've promoted our 'Erbert for hittin' the sergeant. They've made him a courtmartial."

Right You Are

At a dinner party the guests were discussing whether women or men were the more trustworthy in business.

"No woman can keep a secret," said one man, scornfully.

"I don't know so much about that," retorted the forbidding looking woman sitting opposite him. "I've kept my age a secret ever since I was twenty-four."

"Oh," replied the man, "you'll let it out some day, though."

"I doubt it," was the answer; "when a woman has kept a secret for twenty years, she can keep it forever."

Wild Guess

Freddy, can you tell the class what a saw horse is?

I ain't sure, but I guess it's the past tense of sea horse.

Misdirected

Although possessed of great modesty respecting his own person, George Washington insisted that due respect be shown toward all the titles and offices bestowed upon him by his fellow-countrymen.

One day during the Revolution a messenger arrived from General Howe under a flag of truce with a letter addressed to "Mr. Washington." The general took the communication, glanced at the superscription, and said, "Why this letter is not for me! It is directed to a planter in Virginia. I will keep it and give it to him at the end of the war."

Then, putting the letter in his pocket, he ordered a resumption of the hostilities. In an hour another letter arrived addressed to "His Excellency, General Washington."

A Sure Thing

A minister was asked by one of his least respectable members to offer prayers on Sunday for Anna Bell. The clergyman did so.

A few days later the pastor asked the member if he desired the prayers for Anna Bell to be repeated.

"No, thank you kindly," was the courteous reply. "She won last Monday at 7 to 1."

Dangerous

Have you ever laughed so hard you thought you'd die?

No, but I thought I might die after I laughed at the general.

Remedy

"I though you said you gave your horse turpentine for distemper last week."

"I did."

"Well, I gave my horse some yesterday and he died."

"So did mine."

Safe at Sea

Could I see the captain?

He's forward, Miss.

I'm not afraid, I've been out with college boys.

Silence on the Greens

"Oh, horrors! I never heard such swearing since I was born."

"Madame, I don't blame them for cussing when you were born."

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Safety Gas Main Stopper Co. —
Jack A. Schley 70
*Schlumberger Well Surveying Corp. —
The Second National Bank of Houston —
*Security Engineering Co. —
Seismic Exploration Co. —
Seismograph Service Corp. —
*Shaffer Tool Works —
Shell Oil Co., Inc. —
Shilstone Testing Laboratory, Inc. 70
*SKF Industries, Inc. —
A. O. Smith Corp. —
*E. M. Smith Co. —
*South Chester Tube Co. —
South Texas School of Law 70
Southern Engine & Pump Co. —
Southern Pacific Lines —
Spang Chalfant, Inc. —
*Spang & Company —
*Sperry-Sun Well Surveying Co. —
Standard Supply and Hardware Co. —
*Standco Brake Lining Co. 70
*Star Drilling Machine Co. —
Straus-Bodenheimer Co. —

T

E. C. Tecktonius Manufacturing Co. —
*Templeton, Kenly & Co. —
Texaco Development Corp. —
The Texas Co. —
Texas Electric Steel Casting Co. —
Texas State Hotel 69
The Thermoid Co. —
Thompson Tool Co. —
*Thornhill-Craver Co. —
*The Timken Roller Bearing Co. —
Edgar Tobin Aerial Surveys 67
*Tretolite Co. —
Trinity Portland Cement Co. —
Tulsa Shock Absorber Co. —
*Twin Disc Clutch Co. —

U

*Union Wire Rope Corp. —
*Union Carbide & Carbon Corp. —
*Unit Rig and Equipment Co. —
*United States Rubber Co. —
United States Steel Corp. 3
*Universal Atlas Cement Co. —
*Universal Engineering Co. —

W

P. A. Ward & Co. —
Warner & Swasey Co. —
*Waukesha Motor Co. —
*Well Machinery & Supply Co. —
Well Surveys, Inc. —
Western Electric Co. —
*Westinghouse Electric & Manufacturing Co. 4
*Wheeling Machine Products Co. —
*The Wheland Co. —
White-Plaza Hotel 70
Wichita Engineering Co. —
*Wickwire Spencer Steel Co. —
*J. H. Williams & Co. —
*Wilson Manufacturing Co. —
*Wilson Supply Co. —
*Wisconsin Motor Corp. —
Witte Engine Works 77
*Worthington Pump & Machinery Corp. —
Wyatt Metal & Boiler Works —

Y

Youngstown Sheet & Tube Co. —